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Limited mandibular movements due to enlargement of the coronoid processes

■ *Robert B. Shira,* D.D.S., and Roderick L. Lister,† D.D.S., Washington, D. C.*

Uncommon or unusual oral conditions are not of universal interest, yet they are occasionally encountered in the practice of oral surgery, and correct diagnosis and proper treatment are of the utmost importance. Among the rare conditions in this category is one that produces limitation of the movements of the jaw as the result of a gradual enlargement of the coronoid processes of the mandible. As this enlargement progresses and becomes of sufficient size, the enlarged bony processes strike against the inner surface of the malar bone, producing limitation of normal mandibular excursion.

■ *Etiology*

Enlargement of the coronoid process may be unilateral or bilateral. Unilateral enlargement is most frequently the result of an osteochondroma[1] or the development of a simple exostosis. Abnormal healing after fractures of the coronoid process may also produce this unilateral enlargement. The cause of bilateral enlargement is more obscure. When both coronoid processes are involved, the conditions that produce unilateral enlargement are usually not seen and the bilateral enlargements appear to be mere overgrowths of bone. The cause of this overgrowth is not known. An abnormal developmental defect in which the cartilaginous growth centers in the coronoid process persist and cause continued growth and hyperplasia of these parts, however, is a theoretical possibility.

■ *Diagnosis*

Limitation of mandibular movement due to enlargement of the coronoid process is difficult to diagnose. A carefully taken history of the patient usually reveals that he at one time was able to open his mouth in a normal manner. The condition is progressive. It usually develops

*Colonel, Dental Corps, U. S. Army. Walter Reed Army Hospital.

†Lieutenant Colonel, Dental Corps, U. S. Army. Walter Reed Army Hospital.

1. Shackelford, R. T., and Brown, W. H. Osteochondroma of coronoid process of mandible. Surg., Gynec. & Obst. 77:51 July 1943.

slowly over a long period of time, and the reduction in the opening is so gradual that the patient may be unaware of the condition. Usually there is no pain associated with the condition. The condition is frequently discovered by a dentist who encounters difficulty in carrying out some dental procedure because of limited opening. Facial asymmetry with minimal to moderate enlargement of the involved side has been noted in the majority of instances in which osteoschondromas have been the etiological factor,[1-3] but, when these tumors are not present, the facial appearance is usually normal. The most significant observation on examination is inability to open the mouth to its normal extent. Lateral excursions, although limited, can be made, and no pain is noted in the temporomandibular regions during movement or on palpation of the joints. Attempts to open the jaws by a distracting force are unsuccessful, and, as pressure on the distracting instrument is maintained, a dull pain usually develops in the malar region on the involved side or sides.

Diagnosis is confirmed by careful roentgenographic studies. Routine views are frequently insufficient to disclose the condition, but, when exaggerated Waters' and vertex-submental (vertical submental) views are utilized, the abnormal enlargement of the coronoid process can be visualized. When these views are taken with the patient in the open mouth position, the impingement of the coronoid process against the inner surface of the malar bone can be demonstrated. Special tangential views, with the center rays passing through the cheek, may give added information.[2] Laminagrams are also an additional aid in verifying the diagnosis.

In making a differential diagnosis, the various pathological entities that produce limited mandibular movement must be considered. Among the more easily recognized conditions are temporomandibular joint disturbances, infections, fractures, neoplasms, prolonged immobilization after fractures and fibrosis produced by large amounts of radiation delivered through the facial regions. Other factors, more rare but still well-documented, are myositis ossificans, tetanus and paralysis resulting from central lesions. These conditions are usually sufficiently characteristic so that the experienced clinician has little difficulty in determining the correct diagnosis.

■ *Treatment*

Treatment consists of surgical removal of the abnormal coronoid process or processes. When involvement is unilateral, only the involved side need be removed. The surgical approach varies with the operator. Some utilize an incision through the skin overlying the zygomatic arch,[1,2,4] whereas others prefer a submandibular approach. The latter is ideal, since good access to the coronoid process may be secured through this approach, which usually obviates the danger of injury to vital structures in the region. An intraoral approach is usually contraindicated because of lack of access caused by the

2. Shackelford, R. T., and Brown, W. H Restricted jaw motion due to osteochondroma of coronoid process. J. Bone & Joint Surg. 31-A:107 Jan. 1949.

3. Brailsford, J. F. Unusual osteochondroma from coronoid process of mandible. Brit. J. Radiol. 25:555 Oct. 1952.

4. Van Zile, W. N., and Johnson, W. B. Bilateral coronoid process exostoses simulating partial ankylosis of the temporomandibular joint. J. Oral Surg. 15:72 Jan. 1957.

limited vertical opening, although Brown and Peterson[5] have reported good results with this method. After exposure, the involved processes are sectioned with burs and a chisel and removed.

After the removal of the elongated process or processes, the return to normal vertical opening is usually slow. The long period of restricted jaw excursion produces a degree of fibrosis or atrophy of the muscles of mastication which prevents the rapid return to normal function even though the mechanical obstruction has been relieved. Exercise, heat therapy, massage and sometimes electric stimulation to the muscles hasten recovery. Eventual return to normal function can be anticipated, however, provided the obstruction has been completely relieved.

The following report illustrates the problems encountered in a case of bilateral enlargement of the coronoid processes.

■ *Report of a Case*

HISTORY—A 14 year old boy was referred to the oral surgery section of Walter Reed Army Hospital on January 5, 1956, for evaluation of an unusual limitation of movement of the mandible. This limited movement was first noted on May 4, 1955, by a dentist who was placing restorations in several carious teeth prior to orthodontic treatment. He noticed that the patient could not open his mouth normally. At first he felt that the patient was uncooperative, but, when he continued to ask the boy to open his mouth wider, the patient stated that he was opening it as wide as possible. Attempts to separate the jaws forceably proved this to be correct. The patient was somewhat surprised to learn that he could not open his mouth as wide as other people. The limited opening had never been called to his attention, and, since no pain or discomfort was associated with the condition, he was unaware that an abnormal condition existed. He had experienced no difficulty in eating, in fact he was a heavy eater and was very well developed for his age. His parents were also surprised when the condition was brought to their attention, for they had noted no abnormality, and the boy had never complained of any trouble with his jaws.

A carefully taken history established the fact that this patient apparently at one time had had a normal opening. At the age of two and a half years his tonsils and adenoids had been removed. As a small child he had had repeated episodes of sore throat and infected ears and was under more or less constant professional care. Frequent swabbing of the throat had been required, yet none of the physicians who cared for the child made any mention of difficulty in visualizing or treating the throat because of an inability to open the mouth. He lost his first deciduous teeth at the age of seven, and from that time on he received regular dental care. All deciduous teeth except two were extracted, but nothing was ever mentioned to the parents about any limitation of opening. In 1953, his parents noted a crowding of his teeth and took him to an orthodontist who recommended a period of observation before starting treatment. Again, no mention was made of any difficulty in conduct-

5. Brown, J. B., and Peterson, L. W. Ankylosis and trismus resulting from war wounds involving coronoid region of mandible. Report of three cases. J. Oral Surg. 4:258 July 1946.

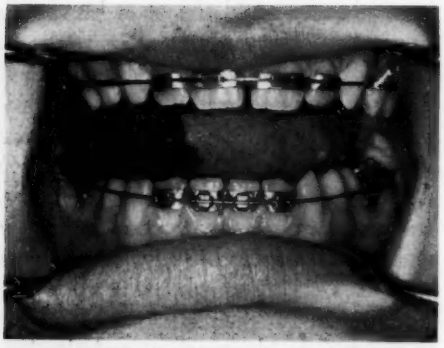

Fig. 1—Amount of vertical opening at time of initial examination on January 5, 1956, was 8 mm. Compound block fitting accurately between teeth was utilized to determine if condition was progressive. In period of months it became impossible to reinsert block, indicating that limitation of vertical opening was progressive

ing this examination or of any noticeable restriction in opening. In 1955, the orthodontist decided that treatment should be started, but first he referred the boy to his own dentist for restorations in several carious teeth. As mentioned previously, on May 4, 1955, during his first appointment for these restorations, the dentist noted a limited vertical opening, and it was with great difficulty that the restorations were completed.

On referring the patient back to the orthodontist on June 20, the dentist called attention to the limited vertical opening which he judged to be ½ to ¾ inch. He also advised the patient and the parents of the condition.

The orthodontist referred the patient to various clinics and consultants in an attempt to determine the cause of the limited movement. Many roentgenograms of the facial and temporomandibular regions were made, but no etiological factor could be found. Consequently, the orthodontist proceeded with the construction of the orthodontic appliances, and, although he experienced considerable difficulty because of lack of access, he succeeded in placing these appliances in December 1955. On learning that the patient was entitled to care at Walter Reed Army Hospital, he referred the child there for evaluation of this inability to open the mouth to the normal extent.

EXAMINATION — An examination at Walter Reed Army Hospital revealed the patient to be a very well-developed boy who was large for his age. He had no pain or discomfort, and his only problem was his inability to open his mouth to a normal extent. No asymmetry of the facial regions was noted. The teeth were all present and in excellent condition, with maxillary and mandibular orthodontic appliances in place. When the patient opened his mouth, the limited movement was quite obvious. The widest possible vertical opening measured 8 mm. between the incisal edges of the anterior teeth (Fig. 1). The patient could make lateral excursions of the mandible, but they were quite limited. There was no deviation of the mandible to either side on straight vertical opening. Palpation of the temporomandibular joint regions bilaterally revealed only slight condylar movements. Heavy palpation in these regions did not produce pain. Attempts to distract the jaws forceably by an elastic force were unsuccessful in increasing the vertical opening, but the maintenance of this force over a period of time produced great discomfort and pain in the region of the cheeks (Fig. 2).

Routine roentgenographic studies of

the temporomandibular joint regions revealed that the joints were normal but that there was very little movement of the condyles in the open mouth position. Special roentgenographic studies of the facial bones, however, were informative. Waters' views showed a rather striking elongation of the coronoid process on both sides. In addition, there was also a widening of the processes at their anterior borders (Fig. 3, left). Special vertex-submental views, with the mouth in the open position, demonstrated an actual impingement of the coronoid processes on the posterior aspect of the malar bone on each side (Fig. 3, right). A bone reaction, or enlargement of the malar bone at the point of contact of the coronoid process on the right side, could be visualized in these views. A reevaluation of the routine posteroanterior roentgenograms of the mandible showed elongation of the coronoid processes that had been overlooked in the initial examination.

TREATMENT AND COURSE—A question arose as to the advisability of surgical intervention. The patient was in excellent health and appeared to be none the worse for having limited opening, from either a physical or a psychological standpoint. It was felt to be important to determine whether the condition was progressive. Consequently, a modeling compound block was constructed to fit accurately between the maxillary and mandibular teeth at the widest vertical opening. This block was preserved as a permanent record. The patient was then observed for approximately five months. By using the compound block as a guide, it was evident that the enlargement of the coronoid processes was progressive and that the amount of movement was decreasing gradually. A decision to remove the coronoid processes was made, and the patient was admitted for surgery on July 9, 1956.

Fig. 2—Elastic distracting force (trismus appliance) failed to increase vertical opening, but when traction was maintained for short time patient complained of discomfort in region of cheeks

On July 10, using general nasoendotracheal anesthesia, the coronoid process on the right side was exposed through a submandibular approach. This approach was subperiosteal and exposed the entire lateral surface of the ramus and the coronoid process. The coronoid process was noticeably elongated and widened along its anterior margin, and the portion of the coronoid process which impinged on the inner surface of the malar bone could be palpated. The coronoid process was transected by burs and chisels along a line extending from the sigmoid notch anteroinferiorly to the anterior border of the ascending ramus. The sectioned coronoid process was freed from all periosteal attachments and removed. The operative wound was packed with hot, wet dressings, and the procedure was repeated

on the left side. Immediately after the removal of the coronoid process on the left side, the mandible was manipulated and normal movement was noted. The wounds were then closed on both sides, and pressure dressings were applied.

The resected specimens showed considerable roughening and erosion on their widened anterior margins. Both resected coronoid processes were noticeably larger and wider when they were compared with the coronoid processes of a normal mandible (Fig. 4). Microscopic sections showed reactive new bone formation in the areas corresponding to the roughened sites. There was some fibrosis of the marrow, but there was no evidence of neoplastic changes (Fig. 5).

The patient's postoperative course was satisfactory. There was moderate edema and soreness, but this gradually resolved, and, as the soreness from the operative procedure subsided, the patient was encouraged to exercise his jaws. He was discharged on July 18 and was followed up as an outpatient. At the time of discharge the amount of vertical opening was 22 mm.

Return to normal mandibular excursions came slowly. Exercises, heat therapy and electric stimulation of the muscles were utilized to improve movement. On August 6, 1956, the regular use of an elastic distracting device to increase the vertical opening was begun (Fig. 2). The patient was very cooperative and carried out all instructions in detail. On August 15, approximately five weeks after surgery, the patient was lost to direct observation since the family was transferred overseas. At this time the vertical opening was 26 mm.

Continued followup was possible by correspondence and by observation by dentists at the overseas post. The patient continued with the physical therapy and

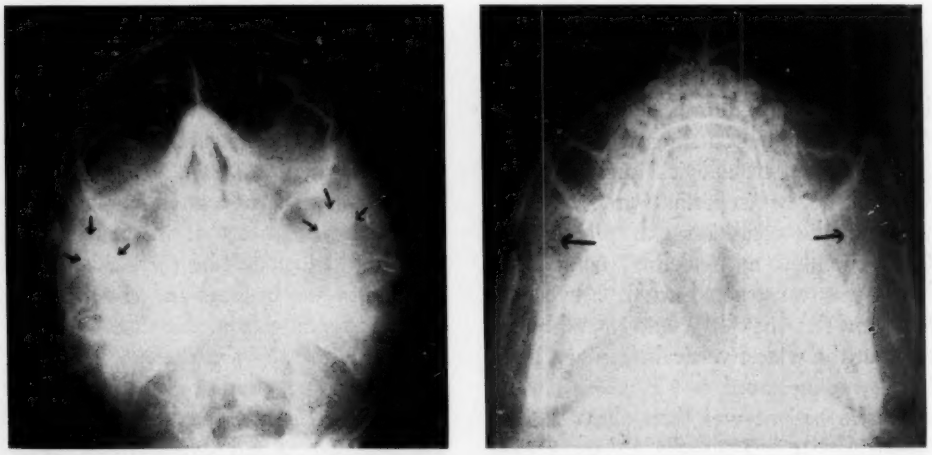

Fig. 3—Left: Waters' view reveals pronounced bilateral elongation and widening of coronoid processes. Right: Vertex-submental view in open mouth position reveals actual impingement of coronoid processes on malar bones

the use of the distracting appliances for approximately four months. The increase in vertical opening continued to be gradual and constant. In October, the vertical opening was 37 mm.; in January 1957, 39 mm., and, in May 1957, at the time of the last observation, 42 mm. (Fig. 6). The parents reported that the postoperative progress had been completely uneventful.

■ *Comment*

Limitation of movement of the mandible caused by enlargement of the coronoid processes is a very rare disease entity. Despite its rarity, enlargement due to osteochondromas seems to be well documented. Enlargement from other causes appears to be much more obscure.

The etiology in the instance described falls within this latter category. The findings are not consistent with osteochondroma of the coronoid process. In the reported instances of this condition,[1-3] the findings have been very similar; namely, (1) unilateral occurrence, (2) facial asymmetry, (3) a mushroom-shaped pedunculated mass, and (4) osteolytic defects of the malar bone at the point of contact with the tumor. In the patient whose case is reported in this paper, the lesions were bilateral, there was no facial asymmetry, the enlargements were not mushroom-shaped but appeared to be overgrowth of the coronoid processes, the reaction produced in the malar bones was one of bone production rather than of bone destruction, and there was no microscopic evidence of neoplasia.

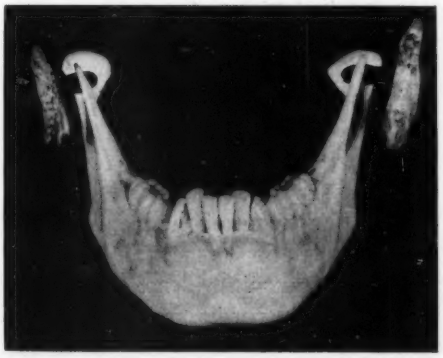

Fig. 4—Resected coronoid processes were pronouncedly larger, longer and wider than coronoid processes of normal mandible. Note roughening and eroded appearance of resected coronoid processes in region where they contacted the inner surfaces of the malar bones

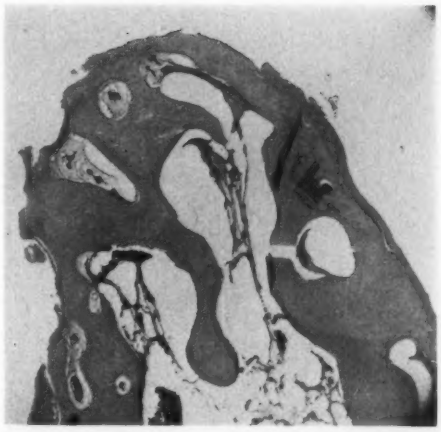

Fig. 5—Photomicrograph of resected coronoid process. Reactive new bone formation is evident, with some fibrosis of marrow but no evidence of neoplastic change

The lack of any history of trauma rules out abnormal healing after fractures of the coronoid processes as a possible cause.

Simple bony exostoses may be considered as a possible cause. They may occur in any locality and frequently are found on bone at the point of insertion

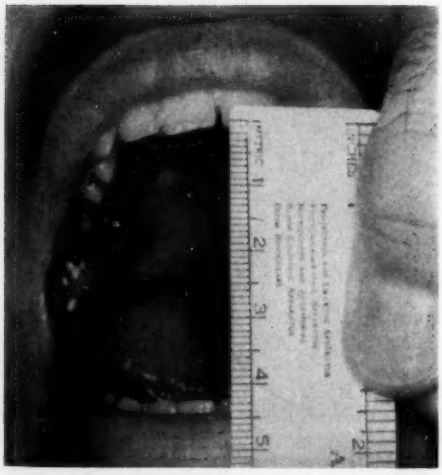

Fig. 6—Amount of vertical opening at time of discharge from hospital was 22 mm., measured between incisor teeth, but it had increased to 42 mm. by May 1957, 11 months after surgery, as shown in photograph

of muscles or tendons or at the junction of two bones.[6] Although muscular and tendinous attachments are present on the coronoid process, it does not form a junction with any other bone. Exostoses in this area are extremely rare, and their presence in this case is a very remote possibility.

There is a striking similarity between the present case and the one reported by Van Zile and Johnson.[4] These authors felt that the entity they encountered was a developmental deformity and used the term "bilateral coronoid process exostoses" in the title of their article. In discussing the etiology, they said that there was a possibility of the enlargement's originally being osteochondromas which had reached maturity. They felt, however, that, with the repeated irritation of the tumors by contact with the malar bones, a superimposed reactive osseous hyperplasia may have developed which involved the coronoid processes and the malar bones and reduced the space over which the coronoid processes could move. Although their theory is most tenable, the case they report does not fit into the pattern of the other reported cases of osteochondromas of the coronoid process, and nothing in their pathological report suggests the presence of an osteochondroma.

Continued growth of the coronoid processes as a result of a persistence of the cartilage growth centers at the tip of the coronoid processes should be considered. Weinmann and Sicher[7] state:

> centers of cartilage, similar to that found in the condyle, develop at the tip of the coronoid process and, later, at the symphysis. These growth centers are of less importance for the growth of the mandible than the growth centers in the condyle. The cartilage in the coronoid processes disappears as early as the sixth intrauterine month and the cartilage in the symphysis during the first year of postnatal life.

It is logical to suspect that if the cartilage growth center of the coronoid process did not disappear at the normal time, continued gradual growth of these processes would follow and result in hyperplasia and enlargement of the processes. In the case described, the bilateral involvement, the slow, gradual, progressive limitation of movement of the mandible, the normal facial appearance and the absence of microscopic evidence of neoplasia indicate that the persistence of the growth centers of the coronoid processes as the

6. Thoma, Kurt H. Oral pathology; a histological, roentgenological, and clinical study of diseases of the teeth, jaws, and mouth, ed. 4. St. Louis, C. V. Mosby Co., 1954, p. 1241.

7. Weinmann, Joseph P., and Sicher, Harry. Bone and bones; fundamentals of bone biology, ed. 2. St. Louis, C. V. Mosby Co., 1955, p. 92.

etiological factor should be considered as a distinct possibility.

■ *Summary*

A rare condition producing progressive limitation of movements of the jaw resulting from enlargement of the coronoid processes of the mandible occurred in a 14 year old boy.

Symptoms of the condition include inability to open the mouth to its normal extent and even attempts to open the jaws by a distracting force are unsuccessful. Diagnosis is confirmed by careful roentgenographic studies, although routine views are frequently insufficient to establish the diagnosis.

Treatment consisted in the case reported of surgical removal of the involved coronoid processes and exercise, massage and other forms of postoperative therapy.

After consideration of the possible causes of the condition, it is suggested that the persistence of the cartilaginous growth center of the coronoid processes, resulting in continued growth of the coronoid processes, is a possible etiological factor in this condition.

Ridge extension: review of indications and technics

■ *Gustav O. Kruger, D.D.S., Washington, D. C.*

The desirability of surgical intervention to aid the prosthodontist in instances of shallow mouth sulci has been established. Experience, more skillful and atraumatic technics, newer suture materials, and better drug control of possible infection have made the results more predictable.

The technics are concerned mainly with a repositioning of structures, including muscles, on the bone. Nothing much can be done if complete resorption of the alveolar bone has left an inadequate jaw. Even if it were feasible to reposition the structures to the inferior border of the mandible, there would still be no significant advantage in sulcus depth if the bone is too small. Moreover, such repositioning is limited by natural structures such as the mental foramens and the base of the malar process.

Many methods have been advocated with varying theories behind them. The technics involve different degrees of surgical difficulty, and they satisfy specific indications. A review of the most commonly used methods follows; in some instances the technics are modified by com-

Professor and director, department of oral surgery, Georgetown University School of Dentistry.

mon usage. The mandible will be used for purposes of illustration and description.

■ *Technics for Ridge Extension*

COLLETT'S METHOD—In the method described by Collett,[1] an incision is made over the crest of the alveolar ridge through the mucoperiosteum. A periosteal elevator is used to elevate the periosteum and its attached tissues, including submucosa and muscles. A previously fabricated denture is then placed in the mouth, the extended flanges of which support the mucobuccal fold in its new position.

The height of the denture borders is determined by making a preliminary overextended impression of the mouth. The distance between the crest of the ridge to a line placed in the center of the mucobuccal fold at rest is measured on the cast (Fig. 1). This distance is transferred to the height of the denture flange (Fig. 2).

Many operators place a reinforced zinc oxide paste dressing in the denture. It is usually left in place without removal for four days.

Resorption of the alveolar crest is usually blamed for the nonexistent sulcus. There is another cause. It has been noted in the undergraduate surgery clinic that

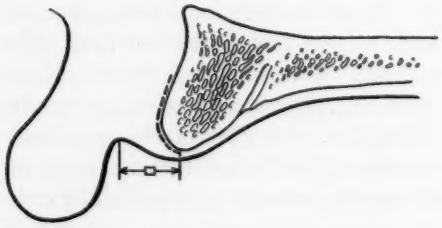

Fig. 1—Collett's method. Distance between crest of ridge and center of mucobuccal fold is measured. This height is added to denture flange

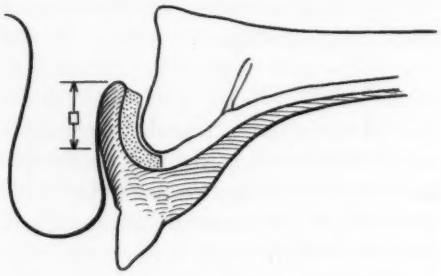

Fig. 2—Denture with higher flange in place immediately after operation. Incision has been made at crest of ridge. Fold is supported by denture flange

the student has difficulty in raising the periosteal attachment while performing an alveoloplasty. The periosteum is attached to the ends of bones and is free beyond that, much as a cuff on a sleeve. Once the student has raised the tight attachment at the crest of the ridge, he finds the attachment above that easy to detach, and sometimes he cannot refrain from erroneously passing the periosteal elevator to the nasal spine. After cutting of the bone is accomplished, he removes what appears to be excess tissue at the incision line and sutures the mucoperiosteal tissue ends together, with the result that he has obliterated the normal sulcus height. Great care must be taken that the periosteal elevator does not free what small attachment there is above the necessary level of operation.

KAZANJIAN TECHNIC—Kazanjian[2] described a method that has become standard. He has made use of the principles of

1. Collett, H. A. Immediate maxillary ridge extension. D. Digest 60:104 March 1954.

2. Kazanjian, V. H. Surgery as an aid to more efficient service with prosthetic dentures. J.A.D.A. 22:566 April 1935.

plastic surgery in order to cover the site of surgical intervention with epithelial tissue.

An incision is made in the mucosa of the inner surface of the lip (Fig. 3). The distance away from the crest of the ridge (on the lip side of the mucobuccal fold) is determined by the depth of sulcus desired. The incision is extended through the mucosa only. The mucosa is then undermined by sharp or blunt dissection back to its base on the crest of the ridge (Fig. 4). Depth is obtained in the sulcus by sharp dissection next to the bone, taking care that the periosteum is not incised.

When sufficient vertical depth has been obtained, the mucosal flap is laid down over the bone and its periosteum much as a window shade would be pulled down over it. The edge of the mucosa is sutured carefully to the periosteum by interrupted vertical mattress sutures; this procedure is difficult. Atraumatic no. 00000 gut sutures are used.

In order to insure that the depth obtained is maintained during healing, pressure is brought to bear in the bottom of the wound with a rubber tube. It is important that one of sufficient size be used, and usually a size 16 French soft rubber urethral catheter is employed, although as large as size 20 has been used. Polyethylene tubing is excellent.

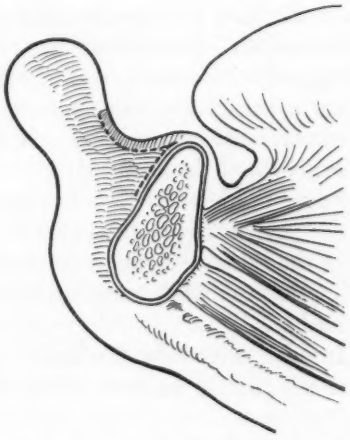

Fig. 3—Kazanjian technic. Incision made through mucosa on inner surface of lip

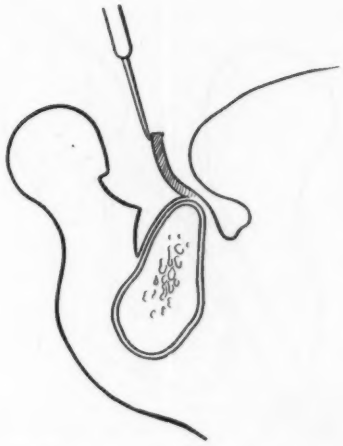

Fig. 4—Mucosa dissected back to base on crest of alveolar ridge. Flap held out of way with instrument while sulcus depth is obtained by supraperiosteal dissection

By means of a straight needle, a double strand of nylon is placed circumferentially around the tube, through the tissues, and out to the skin where it is tied over a small portion of cotton roll (Fig. 5). A minimum of three such sutures are placed, one in the middle and one near each end of the tube. No attempt is made to attach the sutures which hold the tube to the edge of the mucosa at the line of incision on the lip, although the edge of the mucosal flap may be included.

A nonabsorbable material is used for the sutures, brought out to the skin, since

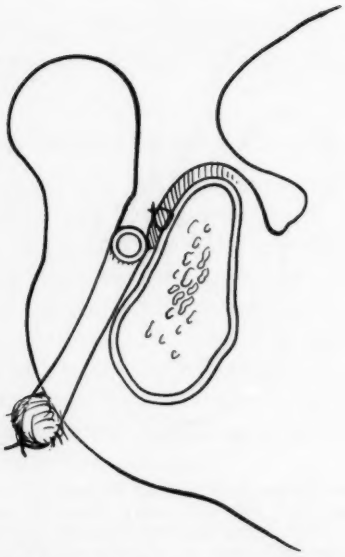

Fig. 5—Mucosal flap sutured to periosteum. Tube held in place at bottom of new sulcus by circumferential sutures tied around cotton rolls

silk and cotton act as a wick to carry oral fluids into the deeper tissues, with an increased possibility of skin abscesses at the point of exit. The wound is covered with benzoin tincture. An external pressure bandage is worn for three days.

The tube and its sutures are removed in seven days. Impressions are made and the denture is inserted as soon thereafter as possible.

Kazanjian emphasized two points in this procedure. The incision must be made far enough away from the crest of the ridge to cover completely the periosteum exposed by vertical deepening. The periosteum must not be cut, since it serves to maintain the sutures holding the mucosal flap.

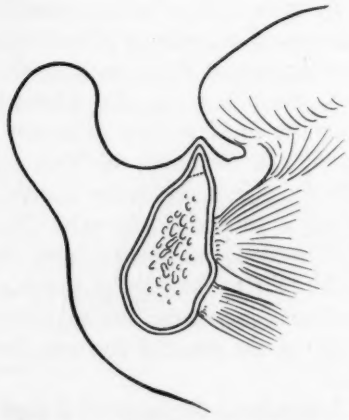

Fig. 6—Note knifelike ridge and shallow sulcus

GODWIN'S PROCEDURE—In many instances the depth of a sulcus is obliterated by pendulous masses of submucosal fibromatoses. Removal of these heavy masses is all that is necessary. Preservation of the overlying mucosa is desirable in these instances.

In the maxilla, Godwin,[3] modifying Kazanjian's original technic, advocated excising *in toto* the larger pendulous masses. A horizontal incision then is made high in the labial fold, and the mucosa is undermined to form a flap. Mucosa is undermined toward the crest of the ridge to form a palatal flap. The fibromatous submucosa is dissected out under the flap. The labial flap is then sutured to residual tissue over the bone as high as possible, and the palatal flap is sutured over the crest of the ridge. The region in between which is not covered by mucosa is allowed to granulate.

In the mandible Godwin's procedure calls for an incision, of the type

3. Godwin, J. G. Submucous surgery for better denture service. J.A.D.A. 34:678 May 1947.

made by Kazanjian, in the mucosa of the lip. The submucosa is dissected or removed as circumstances warrant, together with the periosteum. The bone is contoured or smoothed as necessary. The mucosal flap is then sutured down into tissues beyond the newly formed sulcus, and a rubber catheter is inserted as in the Kazanjian procedure. A zinc oxide and eugenol dressing is placed under the tubing to prevent union of the raw surfaces.

This technic is designed to allow sculpturing of the bone at the time of sulcus deepening, and differs from that of Kazanjian in raising of the periosteum.

Fig. 7—Cooley technic. Incision is made over crest of ridge through periosteum

COOLEY TECHNIC—Cooley[4] has attempted to correct two of the disadvantages of the Kazanjian procedure. First, in many instances the bony ridge is uneven or sharp (Fig. 6); this condition cannot be corrected through an intact periosteum. Second, the position of the mental foramen influences the depth that can be obtained in the mandibular sulcus.

The incision is made over the crest of the ridge through the periosteum (Fig. 7). Depth is obtained immediately by stripping the periosteum to the position desired. The bone can be contoured or smoothed as necessity demands. The mental foramens can be repositioned downward by the use of bone burs while the contents of the foramens are held out of the way by skin hooks.

Epithelial covering is obtained by undermining the mucosa of the lip from the incision to the vermilion border (Fig. 8). An acrylic splint is placed over the crest of the ridge in such a manner that it protects any portion of the bone not covered by epithelium. It also serves to maintain the depth of the newly formed sulcus. The splint is held in place by modified circumferential wiring (Fig. 9 and 10).

One of the great problems in this work is the prominent genial tubercles seen in mandibles which have completely

4. Cooley, De Orr. Method for deepening the mandibular and maxillary sulci to correct deficient edentulous ridges. J. Oral Surg. 10:279 Oct. 1952.

Fig. 8—Mucosa undermined to vermilion border

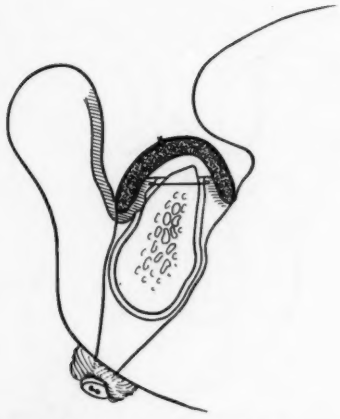

Fig. 9—Acrylic splint maintained by circumferential wiring creates sulcus depth

Fig. 10—Healed ridge. Note areas of regeneration over portions of bare bone

lost the alveolar ridge. Cooley advocates a technic for lingual frenotomy to give more space on the lingual side. Shea and Wolford[5] have advocated simple excision of the bony tubercles. Others, however, have been reluctant to sever the attachments of the muscles controlling the tongue.

CLARK TECHNIC—Clark[6] has stated four principles of plastic surgery that form the basis of his technic:

1. Raw surfaces on soft tissue contract, whereas the same surfaces covered with epithelium show minimal contracture.

2. Raw areas on bony surfaces cannot contract.

3. Epithelial flaps must be sufficiently undermined by sharp dissection to permit retention without tension.

4. There is a tendency for the return to former position of soft tissues undergoing plastic revision, and therefore overcorrection is necessary together with firm fixation.

The Clark technic is especially adapted for the anterior part of the mandible in instances in which the mentalis muscle is involved. Incision is made over the crest of the ridge, and immediate sulcus depth is obtained by sharp and blunt dissection (Fig. 11). The dissection is carried down supraperiosteally. The lip mucosa is then undermined from the edge of the incision to the vermilion border. A nonabsorbable suture is placed through the free edge of the mucosal flap in mattress style, and the two ends are carried out to the skin surface where they are tied over a cotton roll (Fig. 12). Three such sutures are placed. The raw surface of the soft tissue is thus covered, leaving the periosteum-covered raw surface over the bone to granulate and epithelize.

5. Shea, C. R., and Wolford, D. R. Removal of genial tubercle for prosthesis. Oral Surg., Oral Med. & Oral Path. 8:1044 Oct. 1955.

6. Clark, H. B., Jr. Deepening of labial sulcus by mucosal flap advancement: report of case. J. Oral Surg. 11:165 April 1953.

TRAUNER OPERATION — When sufficient depth of sulcus is not obtainable by other technics on the buccal and labial surfaces of the mandible, Trauner[7] has advocated a repositioning of the mylohyoid muscle. A criterion for the operation is that the mylohyoid muscle attachment must be located at the level of the crest of the ridge.

Incision is made close to the crest of the ridge on the lingual side extending from the second molar region to the cuspid region. Supraperiosteal blunt dissection is carried down to the mylohyoid muscle. A curved Kelly clamp is placed beneath the muscle, and the muscle is incised down to the clamp. The lingual mucosa and the muscle are caught with a nonabsorbable suture which is carried close to the bone to exit on the skin, where it is tied over cotton rolls. Three such sutures are placed; then a pressure bandage is applied. Both sides of the mandible are treated in one operation, usually in the hospital.

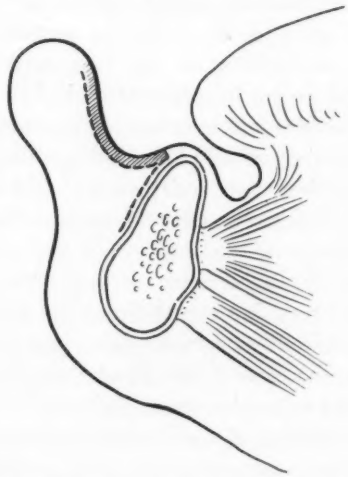

Fig. 11—Clark technic. Incision is made slightly labial to crest of ridge. Sulcus depth obtained by supraperiosteal dissection. Lip mucosa is undermined from edge of incision to vermilion border

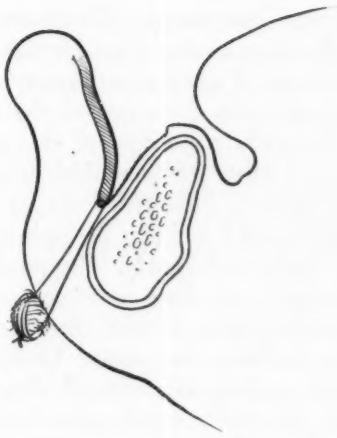

Fig. 12—Mucosal flap held over wound by sutures placed to skin surface

CALDWELL PROCEDURE—A modification of the Trauner procedure has been suggested by Caldwell[8] in order to permit reduction of the bony internal oblique line; such reduction often is necessary. Incision is made through the periosteum over the crest of the ridge. The mylohyoid muscle is detached from the mylohyoid ridge, and the ridge is removed with a chisel. A rubber catheter is transfixed in the lingual sulcus over the intact mucosa by means of sutures carried through to the skin. The ridge incision is then closed. This procedure need not be carried out in the hospital.

7. Trauner, R. Alveoloplasty with ridge extensions on the lingual side of the lower jaw to solve the problem of a lower dental prosthesis. Oral Surg., Oral Med. & Oral Path. 5:340 April 1952.

8. Caldwell, J. B. Lingual ridge extension. J. Oral Surg. 13:287 Oct. 1955.

OTHER PROCEDURES—Electrocauterization has been used with good results for the removal of fibromatous hyperplasia and simultaneous deepening of the sulcus. The main advantages of this procedure are that the pendulous masses which present so little usable mucosa are removed entirely, and that the technic is direct, simple and speedy. The possible disadvantages are those associated with electrocauterization; namely, odor during burning, soreness that persists for some time, and scarring. Where depth alone is desired, a careful surgical technic seems to provide greater permanent space.

Skin grafting is especially adapted to war and other traumatic injuries where no sulcus exists at all. It has been shown that these grafts are less pliable than mucosal grafts, and there is no adhesion associated with them. Skin grafting in the office is more practical than textbooks indicate, particularly today when an aseptic technic is better understood and infection is better controlled. A split-thickness skin graft can be obtained free hand from the inner arm with a razor blade, and, if placed properly around a compound splint, it does well even in the presence of oral fluids and minor infection.

In some instances of massive hypertrophy of tissues in the mandibular molar or maxillary tuberosity sulcus regions, the author has grossly excised the tissue in a large V and then placed a large rubber tube in the region over a zinc oxide-eugenol dressing. The tube is fixed with sutures brought out to the skin and tied over cotton rolls. Usually the excision is supraperiosteal. The technic has been successful and seems satisfactory for inaccessible regions where a procedure for undermining a mucosal flap would present technical difficulties.

■ *Adding to Ridge Height*

In the past, attempts to increase the height of the alveolar ridge with bone and various forms of cartilage have been unsuccessful. The use of fresh and preserved cartilage was followed by resorption of the graft with or without infection. Recently, Blackstone and Parker[9] reported that of 18 intraoral homogenous cartilage grafting procedures in dogs, 11 were successful, even though the dogs gave some difficulty until muzzling of jaws and a liquid diet were instituted. They reported one successful case in a human being.

The author and a co-worker have added freeze-dried cartilage to alveolar ridges in two instances of knifelike ridges where sufficient height was present in the lingual plate. A bulk of cartilage was placed on the labial and buccal sides in order to provide breadth of the ridge. The grafts were placed under the periosteum after an incision of the type used by Kazanjian, but in order to test the healing of the graft no attempt was made to scarify or drill the cortical plate. Both grafts took by first intention and have resorbed less than 30 per cent after 23 months. New dentures were made as soon as was practical after the operation.

Gerry[10] has reported one successful case of fresh autogenous iliac bone grafting to the crest of the alveolar ridge and referred to another successful case.

Grafting, if and when it becomes more uniformly successful, could supplant

9. Blackstone, C. H., and Parker, M. L. Rebuilding the resorbed alveolar ridge. J. Oral Surg. 14:45 Jan. 1956.

10. Gerry, R. G. Alveolar ridge reconstruction with osseous autograft: report of case. J. Oral Surg. 14:74 Jan. 1956.

the discussed technics for surgical extension of the soft tissues. The grafting technics are more physiological in their approach, since they replace the material lost through resorption without disturbing the surrounding musculature and soft structures. The use of banked tissues, such as those preserved by the freeze-drying process, will be especially adaptable when more data has been collected, particularly since a second operation to obtain the bone or cartilage is unnecessary. The procedure can be carried out in the office provided that an aseptic technic is followed.

■ *Comparison of Technics in Labial and Buccal Approaches*

Two main differences among the labial and buccal technics for deepening the sulcus are (1) whether the incision should be made over the crest of the ridge or on the lip and buccal wall and (2) whether the periosteum should or should not be cut.

PLACE OF INCISION—Several factors must be considered in determination of the place of incision. The basic question is: Should the soft tissue side or the bone side be allowed to granulate and later epithelize? The technics of Kazanjian and Godwin cover the bone with a mucosal flap. Clark's procedure covers the soft tissue with a flap. The technics of Collett and Cooley cover the soft tissues with epithelium, but portions of the bone without periosteum are bare under dentures or splints.

1. Contracture is a factor which must be considered. Clark[6] has stated that de-epithelized soft tissues over bone do not contract in healing. He cited as an example the palatal donor site for the flap used to close an oroantral fistula. Godwin[3] stated:

> . . . granulation tissue covering bone has a tendency to contract after its transformation into scar tissue and to draw the healthy movable mucous membrane from its immediate vicinity.

Loss of depth has been noted by experienced operators in all these procedures. Whether there is any less loss with the flaps based on bone is difficult to say. The main problem seems to be a tendency toward obliteration of the artificially created sulcus from the bottom rather than contracture of soft tissues at the donor site, although these two factors are closely interrelated.

The important factor is that of sufficient maintenance of artificial fixation by sutures or tubes, or both, and splints for an optimum time, followed by no loss of time in placing the permanent restoration. Early placement of the denture should be made even if the tissues do not seem conducive to impression-making by ordinary standards. A good portion of the prosthetic procedure, such as the determination of centric occlusion, mounting of casts, selection of teeth and try-in, can be completed before the operation if the bony base is not changed by surgery. The loss of sulcus depth occurs between the surgical procedure and the final placing of the denture.

2. Retention of the denture is another important factor. Fickling, quoted by Godwin,[3] supports the use of the incision in the lip in the Kazanjian technic by stating that the contracture line after

healing is at a high level and that a splint will have a tendency to be pulled downward, thereby aiding retention. In contradistinction, he has found that the crest incision results in a contracture line deeper in the sulcus, and therefore the splint will tend to be thrust upward. Godwin,[3] referring to Fickling, feels the same factors are true with a denture border.

Some prosthodontists do not particularly care for the scar at the denture border region. This scar is noted with all the buccal technics, but particularly with the Kazanjian procedure. The scar forms a firm, immobile sulcus which is bound down to the underlying bone, and does not move under muscular control as it normally would to help retain the denture. The immobile scar, however, will not allow muscular displacement of the denture, as pointed out by Goodsell.[11] The technics of Cooley and Collett usually result in a soft border region. The lingual technics of Trauner and Caldwell do not evoke this criticism.

Any of the technics carried out properly and with proper regard for contraindications affords a great advantage in retention over the original condition.

3. Certain technical details of the procedure should be considered. There seems to be no great difference in technical convenience among the labial and buccal technics with the exception that it is more difficult to undermine the lip mucosa from the crest incision, which must be made by the operator standing behind the patient and working from first one side of the lip and then the other.

Lip pull is a factor with the crest incision, but it is not serious. The same factor was found in the Kazanjian technic when the lip mucosa was grasped by the suture placed around the tube, and therefore many operators do not include the lip mucosa in this suture.

The blood supply to the flap seems to be equally adequate whether it originates from the crest of the ridge or from the lip. The postoperative course seems to be similar with all technics.

The simplest technic is one that has been practiced for many years and recently was described by Collett. Incision over the crest of the ridge through the periosteum and immediate support of the mucobuccal fold by a preformed denture is excellent if a minor advantage in depth is required.

INCISION OF PERIOSTEUM—The question whether or not to incise the periosteum is simpler. The advantages of an intact periosteum as advocated by Kazanjian and Clark include protection of the underlying bone so that infection and pain are minimized and so that it serves as a structure to which sutures can be attached. The technics of Cooley and Godwin, however, show that if alveoloplasty or osteoplasty is necessary, there need be no hesitancy to incise the periosteum. Prospects for better success and comfort are enhanced by modifying the underlying base if needed, so that it is smooth and free from bone spicules.

■ *Lingual Approach*

The lingual technic for repositioning the mylohyoid muscle is more involved and has greater hazards. The lingual

11. Goodsell, J. O. Surgical aids to intraoral prosthesis. J. Oral Surg. 13:8 Jan. 1955.

nerve, the vessels of the floor of the mouth and the submaxillary salivary gland duct are in the field of surgery, which in itself is confluent with the deeper fascial planes of the neck.

The main technical advantage of the Trauner procedure is the intact periosteum. The advantages of the Caldwell modification are that the frequently troublesome mylohyoid ridge or shelf can be removed, and the incision is on the crest of the ridge away from the major anatomic structures.

The lingual approach is one that deserves favorable consideration. A great deal of advantage in depth for the lingual flange of the denture is made possible in otherwise hopeless cases, particularly when the bone is small.

■ *Summary*

There are many technics for surgical extension of the alveolar ridge, some of which employ an incision over the crest of the ridge and others place the incision in the soft tissues adjacent to the ridge. Some technics incise the periosteum in order to smooth the underlying bone, and others make use of an intact periosteum for protection and suturing. The tendency seems to be toward the use of technics which make the incision on the crest of the ridge.

If surgery on the labial or buccal aspect of the jaw is impractical, usually because of extreme resorption, technics for repositioning the mylohyoid muscle afford considerable depth for the placement of the long lingual flanges on the denture.

Experimentation with grafting to increase the height of the bone is being conducted with the newer homogenous banked tissues and the antibiotics. If successful, grafting could serve as a new method for the rehabilitation of mouths that are not amenable to treatment by methods that deepen the sulcus.

■ Tolerance

Civilization has produced nothing finer than a man or woman who thinks and practices true tolerance. Most of us do not think, we just occasionally rearrange our prejudices. Even today, with all the progress we have made in science and education, the quality of true tolerance is as rare as the quality of true mercy. That men of all creeds have fundamental common objectives is a fact one must learn by the process of education. How to work jointly toward these objectives must be learned by experience.—*Frank Knox.*

Controlled rectal anesthesia for the fearful or handicapped patient

■ *Boyd F. Sprague, D.M.D., Portland, Ore.*

Controlled rectal anesthesia or rectal anesthesia *per se* and the administration thereof is probably the least well known to the dental profession. For this reason, and because of my special interest and success with it, the method will be discussed in some detail.

The anesthesia that has proved so satisfactory in my practice is much lighter than that found in the hospital operating room. The goal in administering this anesthesia is to depress the patient just enough to eliminate his fear and to keep him comfortable without obliterating his protective throat reflexes. If this level is not adequate to prevent reaction to pain while work is being done in especially sensitive regions, the initial dosage is increased, or a supplement (local or general) is added at the time and in the amount that is actually needed. Although the patients do not remember anything about the work that is done on them, many remain responsive enough throughout the operative procedure to cooperate in doing whatever they may be asked to do.

"Controlled" comes closer to describing this kind of anesthesia than any other one term found. Dictionary definitions of "control" include "exercise restraint over," "hold in check," and "curb." "Controlled" thus describes one feature of this anesthesia. Other qualifying terms are needed, however—one to indicate that the upper and the lower limits within which the anesthesia is "restrained" are both light ones; and another to signify that it is actually the patient's moment-to-moment response that regulates administration to maintain this level.

Most of the patients that I see are the problem patients and are ones that respond well to this method and route of administration. Rectal anesthesia has many advantages, as indicated by Behrman in writing of rectal anesthesia for the ambulatory child.[1] This form of anesthesia is not always adequate by itself, except as an induction anesthetic agent, although short procedures a half hour average in the very young (up to age four or five) can often be performed without additional anesthetic support.

■ *Classification of Patients*

A classification of patients benefiting from "controlled" rectal anesthesia for operative and surgical dental procedures follows:

1. The extremely apprehensive or fearful person, in order to prevent psychological trauma.
2. The ever-increasing number of

Paper presented before the Section on Anesthesiology, ninety-seventh annual session, American Dental Association, Atlantic City, N. J., October 2, 1956.

1. Behrman, S. J.; Mark, H. I., and Brown, A. A. Rectal thiopental sodium anesthesia for the ambulatory child dental patient. J. Oral Surg. 13:125 April 1955.

Fig. 1—Dental operating chair

allergy patients (such as those who are allergic to procaine hydrochloride), patients with asthma and so forth.

3. Mentally retarded or feebleminded persons.

4. Some of the physically handicapped patients, such as those with cerebral palsy and muscular dystrophy.

The ease with which either operative or oral surgical procedures can be performed with controlled rectal anesthesia is most gratifying. For many of these problem patients, dental treatment, when gently and easily accomplished, is a form of psychiatric therapy in itself.

■ *Armamentarium and Personnel*

The following personnel is needed for the use of controlled, rectal general anesthesia:

1. A dentist trained to work with general anesthesia.

2. One person in charge of anesthesia and formally trained in all types of general anesthesia.

3. A competent nurse assistant.

The necessary equipment is as follows:

1. A contour-type operating chair (Fig. 1) that will allow the patient to sit in a semireclining position, the body supported completely with heavy padding to prevent muscular fatigue during the long procedures.

2. Two suction machines, or a unit with two outlets, one for the twin tube oral evacuator and rest unit (Fig. 2) and one for the assistant to use. The two units are a safety measure.

3. Water and air spray equipment.

4. Pharyngeal airways and laryngoscope.

5. Gas machine for supplementing with nitrous oxide and oxygen. Vaporizer and rebreathing attachments.

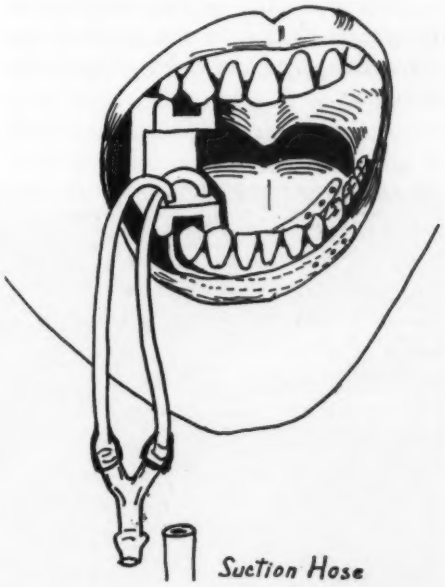

Fig. 2—Twin tube oral evacuator and rest unit. (Since paper was written, twin tube oral evacuator has been made with improved Y connector)

6. Glass syringes, of 5, 10 and 20 cc. capacity, each marked for rectal use only.

7. One short Bardex special urethral retention catheter, no. 129, 30 cc. size 16 French (Boyd Sprague), specification: for children. One regular male size Bardex no. 123, 30 cc. urethral retention catheter, size 16 French (Fig. 3, left) (Boyd Sprague), specification: for adults.

8. Mohr pinch clamps and screw clamps for catheter shut-offs.

9. Intravenous packs, including sterile autoclaved syringe and accessory equipment used in intravenous anesthesia.

10. Assorted glass syringes with needles for intravenous or intramuscular supplemental medication.

11. Intravenous arm board and equipment.

Supplies and general surgery requirements should be the same as for any well-supplied and well-equipped dental surgery.

■ *Administration and Management of Anesthesia*

The arrival of the patient at the office is followed by the suggestion to use the lavatory, and he is then given a bed jacket type of gown to put on. The check list of the preoperative instructions is the same as for other surgical procedures.

In dealing with children or the mentally retarded, parents are asked to stay with the patient in the preparation room. Many times they are able to place the catheters and assist in other ways at the beginning of operative procedures. This would be most impractical in all other types of inductions other than rectal.

The dose of thiopental sodium for rectal administration is based on the patient's weight and estimated tolerance. Some manufacturers recommend a calculation of percentages ranging from 2 to 14 per cent, with 10 per cent as the average. However, the mixture that I generally use

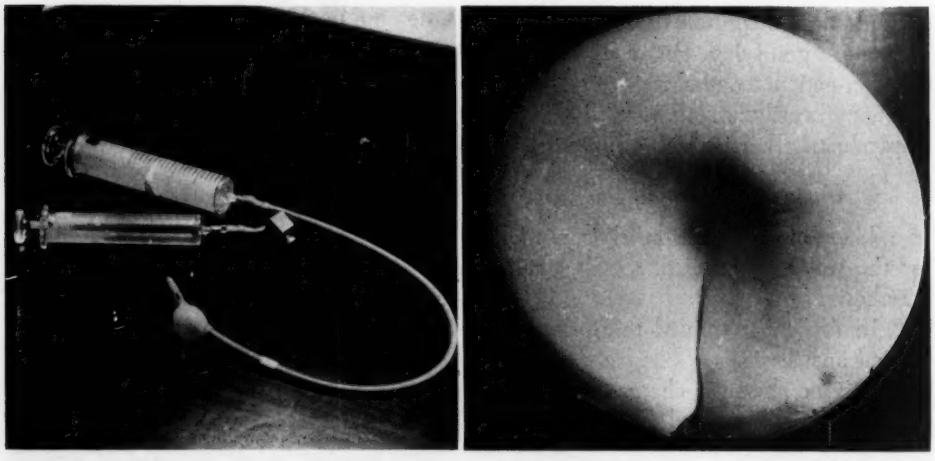

Fig. 3—Left: Inflated two-way urethral balloon retention catheter. Right: Cushion with lead-in channel

is 20 per cent, this higher percentage giving far better results from the induction and recovery standpoint. To make a 20 per cent solution, 1 Gm. of thiopental sodium for rectal administration is dissolved in 5 cc. of prepared distilled water or 3 Gm. in 15 cc. of water. Each cubic centimeter of this solution will contain 200 mg. of thiopental sodium.

The patient is weighed and the dose computed from the manufacturer's chart according to the percentage desired. When a 20 per cent solution is desired, the patient's weight is multiplied by 0.1. This will give the number of cubic centimeters of 20 per cent solution for the basal dose. For a 10 per cent solution, the patient's weight is multiplied by 0.2; this gives the number of cubic centimeters for the basal anesthetic if instilled all at one time. For example, for the average 100 pound person, 100 times 0.1 equals 10.0 cc. of 20 per cent solution, which is considered the basal dose.

Instillation is started by filling the catheter from a loaded glass syringe that contains sufficient anesthetic mixture to charge the rubber catheter and leave a full basal dose in the glass syringe. The catheter is then clamped off to prevent losing its contents and the tip lubricated with a water-soluble ointment. It is then inserted into the rectum 3 or 4 inches, and the balloon is inflated with 10 cc. of air. The catheter tube is then drawn back until tension can be felt with the balloon pressing against the sphincter muscle. For the average patient, the full basal dose is instilled slowly; 30 to 60 seconds is taken for this procedure. After each fractional instillation, a test is made of whether the solution is going into a dry, clean, semidry or liquid area; testing is done by retracting and reinjecting the solution.

With a wet, loose bowel, the liquid contained therein is sometimes drawn off before the initial anesthetic instillation; in this instance the anesthesiologist should proceed with extra caution, testing each instillation by its return action and condition. The urge to expel is occasionally noticed, but with reassurance to the patient that the sensation will soon leave, he will shortly become comfortable. Seepage or elimination is seldom a problem, because of the decreased volume with the higher percentages of anesthetic and with the sealing effect of the balloon.

Sleep is produced in 5 to 30 minutes. The eyelid reflex becomes inactive after about five minutes of sleep. The patient is then moved from the preparation room to the operating chair, where he is placed on a cushion that is designed for the rectal administration of the anesthetic mixture. This cushion (Fig. 3, right) has a lead-in channel, which accommodates the extended catheter, the catheter being allowed to remain in the rectum during the operation. After adjusting the patient into the chair, the head is placed on the special form-fitting head rest (Fig. 4), which is necessary to keep the head immobile during unconsciousness.

The twin tube oral evacuator and jaw-rest unit (Fig. 2) is placed in position between the jaws, opposite to the field of operation. There may be some conscious patient-objection at this point. If the full basal dose has not been given, an additional portion may be instilled, or a little more time allowed (five to ten minutes). This usually will carry the patient into an operative or cooperative stage; at this

Fig. 4—View showing head rest and intravenous anesthetic supplementation

point anesthesia supplementation may be supplied as indicated, using a local anesthetic or nitrous oxide mixture, or both, with a nonsaliva-stimulating vinyl ether.

■ *Terminating Controlled Rectal Anesthesia*

Near the completion of operative procedures where rectal anesthesia has been used alone, that is, without other anesthesia support, the remaining anesthesia mixture is withdrawn via the still remaining catheter. Often from one half to the apparent full amount used in the basal dosage is recovered. (The anesthetic's characteristic bright green color frequently remains unaltered.)

A 10 to 20 cc. syringe is filled with clean, warm tap water. The water is injected through the catheter into the rectum and immediately drawn back. This wash process is usually done several times until the recovered solution is clear.

When there are anesthesia supplements used and deep anesthesia is involved, the rectal anesthetic mixture is removed soon after the beginning of the operation. Thus "controlled rectal anesthesia" serves as the perfect preoperative medication, replacing the oral administration of tablet or capsule barbiturates, which in themselves lack accurate controlled action, and with which, once administered, recovery of the drug potion is practically impossible. The same objection is true of drugs administered intravenously or intramuscularly as preoperative drug administrations.

■ *Recovery*

The period from the completion of the operative procedure to the point of consciousness is usually about the same amount of time required for the operation (one hour operation, one hour recovery). After an adult patient shows sufficient response in the recovery room, he is encouraged to sit up and drink a cup of tea. A person receiving rectal thiopental sodium anesthesia is rarely nauseated during recovery unless he begins to stir too soon and then he may suffer slightly from motion sickness. Dizziness and instability are not uncommon even into the next day, especially when operations are scheduled for late afternoons. Patient must be watched constantly during the first and second recovery stages.

During the first stage in recovery (that of unconsciousness), the patient should not be allowed to lie on his back or in the same position too long.

In the middle stage of recovery (when waking attempts are made, or should be, and gestures to move about are noticed), excitement has never been a factor, but conditions of intoxication are exhibited and a patient should be guarded to prevent him from falling or injuring himself. A cold, wet towel applied to the face will hasten awakening.

The last stage of recovery (that of coherent speech but a residual dizziness) is the longest stage in the recovery period. The patient should still be guarded and watched to prevent self-injury. The patient should never be allowed to stay alone during the night after procedures of any consequence.

■ *Safety Factors*

Anesthesia is kept light enough for the patient to retain protective reflexes, light enough that respiratory, vascular or cardiac depression is not demonstrated and light enough that recovery is rapid. Although laryngospasm and excitement periods are often encountered in the early stages of some general anesthesia procedures, these unpleasant reactions are most generally brought about after periods of extreme excitement, fear and painful stimuli (regardless of how insignificant they may appear at the time to the operator). With rectal thiopental anesthesia there is no contraction or spasm-producing effect on any musculature or excitement-stimulating factors; instead, relaxation and pleasant sleep is the rule.

For some reason there is an entirely different level of safety for the rectal anesthetic barbiturates as compared to the intravenous barbiturates used in anesthesia. Possibly certain impurities or objectionable properties are removed from the rectal instillations because of the blood-carrying agents passing the portal system, where purifying takes place before the anesthetic reaches its point of action in the cerebellum.

The position of the patient (Fig. 4) has a great deal to do with the safety of the method described in this paper. The more delicate the patient's condition, the more important it is for the patient to be in an extremely forward sitting position, for the following reasons:

1. Breathing is freer and less impaired.
2. Throat muscles and trachea are less apt to collapse if the patient is in a sitting position.
3. The tongue is more easily controlled and is less apt to retract into the pharynx, cutting off the airway.
4. Prevention of the collapse of throat structures upon themselves eliminates possible vagal reflex stimulation.
5. Normal physiological functions are more easily cared for by the patient, that is, response to reflex action is less impaired, as in coughing, swallowing and gagging.
6. Foreign objects are not so apt to fall into the throat if the patient is sitting upright.
7. Vomitus, if it should appear, is more easily cared for by aspirating and dropping the head forward, which allows an easy discharge.
8. Artificial respiration is easily, quickly and more effectively instituted, should the need arise.
9. Apnea is recognized and can be brought under adjustment sooner. The patient's head and body can rapidly be put in a knee-chest position, stimulating respiration, circulatory and cardiac function all with the one action.

Premedication for a patient who is to receive controlled rectal anesthesia with thiopental sodium has been discontinued and is not a part of my office procedure. The deletion of preoperative medications has added to the safety and ease of operat-

ing on the extremely delicate and problem patients, for the following reasons:

1. The basic purpose and objective of the preoperative medicaments (atropine, scopolamine and sedatives) are often lost, and the administration of these often causes or tends to encourage the very condition which they are supposed to prevent.

Presedation is not needed, because there will not be the stimulation of fear in the anesthetic induction—consequently the nervous system has not been alerted or sensitized to such an extent that dulling of the senses before induction begins is required.

3. A synergistic or reverse drug action frequently results from obscure endocrine activity that has been activated by anxiety, fear or excitement in combination with many routine preoperative drug administrations.

4. In some instances, certain drugs are administered to counterbalance the side effect or adverse side reaction possibilities of certain other drugs. These other drugs, then, should not be given in the first place.

5. The administration of rectal thiopental sodium causes a slowed-up body function, thus the salivary excretion is curbed. Unless a saliva-stimulating drug is used, there is no need of the Atropa belladonna drugs in premedication.

The only exception to the deletion of premedication is when the patient may be on regular and routine medication, such as insulin or seizure control therapy.

Contraindications are few and definite for controlled rectal anesthesia. They are:

1. Severe embarrassed respiratory function involving the trachea, glottis, or mediastinum.

2. Severe noncompensating cardiac disease.

3. Severe anemia, involving the oxygen-carrying power of the blood.

4. Inflammatory lesions of the rectum.

■ *Comment*

The problem patients of dentistry can be helped materially with a simplified general anesthesia method that is safe and one that will give the operator minute-by-minute control in the early stages of general anesthesia. The method used is rectal administration of thiopental sodium.

The chronically ill dental patients need operative technics and procedures in keeping with the dental condition itself—it is so easy to overbalance seriousness of the dental condition with complicated, hazardous general anesthesia methods.

Although there is nothing new about controlled general anesthesia or rectal anesthesia, as such, controlled rectal anesthesia fills a gap in dentistry by providing a means for preventive and constructive dental service to a neglected group of people.

The safety factors mentioned, such as the light plane of anesthesia, the extreme forward sitting position of the patient, and the deletion of premedication for most patients, are necessary, and one is dependent on the other. It is difficult to say which of these is the most important.

■ *Conclusion*

Dentistry for the psychologically and physiologically handicapped patient can often be of psychosomatic therapeutic

value. The mentally ill or the mildly disturbed patient will often show a noticeable improvement in health and social behavior when a dental problem is solved without adding psychic stress and fears to an already confused mind. The physically handicapped, such as some of the patients with cerebral palsy, can be operated on easily with the extremely light, controlled rectal anesthesia described in this paper.

Subsequent dental appointments can be made into pleasant experiences, rather than fearful and painful hardships as well as times of psychic stress for both operator and patient alike.—*10 Southeast Thirty-ninth Avenue*

Correction of prognathism by subcondylar osteotomy

■ *Edward C. Hinds, D.D.S., M.D., Houston, Texas*

The two most favored procedures for treatment of mandibular prognathism, up to the present time, have been osteotomy of the ramus and bilateral ostectomy of the body of the mandible. In spite of many excellent results, however, both of these procedures are fraught with serious difficulties and potential complications. Ideally, in most instances of prognathism, the goal should be to set back the entire mandibular arch. This allows conservation of all remaining teeth as well as improvement of the gonial angle. A procedure in the ascending ramus will allow such an accomplishment (Fig. 1).

Several variations of the osteotomy of the ramus have been developed over a period of years, including bilateral condylectomy which has many shortcomings. Other more favorable procedures have been vertical osteotomy, sub-sigmoid notch ostectomy (Fig. 2, above) and the subcondylar osteotomy (Fig. 2, below). The chief advantage in these latter procedures lies in the fact that they allow little, if any, possibility of postoperative open bite or nonunion. A more detailed discussion of various procedures for the correction of prognathism has been given in a previous publication.[1]

The idea of a subcondylar osteotomy is not new. In 1910 Babcock[2] discussed the possibility of such a procedure (Fig.

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Bertner professor of surgery, the University of Texas Dental Branch.

1. Hinds, E. C. Surgical correction of acquired mandibular deformities. Am. J. Orthodont. 43:160 March 1957.

2. Babcock, W. W. Field of osteoplastic operations for the correction of deformities of the jaws. D. Items Interest 32:439 June 1910.

3). However, the first subcondylar osteotomy performed for the correction of prognathism was probably performed by Schaefer,[3] who was inspired by Kostecka's[4] use of this procedure for the correction of open bite. Reiter, before his death, had performed a large number of these procedures. Verne and co-workers[5] have published a report of 52 cases in which the operation was performed by Reiter and his followers in Cleveland.

There always have been certain implied hazards in blind osteotomy with the use of a Gigli saw, such as hemorrhage and nerve injury. In 1955 Moose described a subcondylar osteotomy through an intraoral approach, but cautioned that it was a difficult and uncertain procedure.

In the meantime, Robinson[6] had begun to perform the subcondylar osteotomy through a submandibular incision. Independently, I had arrived at the same choice of treatment with only minor variations. Of 20 instances of prognathism at the University of Texas Dental Branch in the past three years, only in one was subcondylar osteotomy not suitable because of disparity between the maxillary and mandibular arches. In this instance, the mandibular arch was elongated and could be corrected surgically only by means of bilateral ostectomy through the body of the mandible.

■ *Procedure*

A 2.5 cm. incision is made beneath the angle of the mandible by blunt and sharp dissection. Care is taken to retract the facial nerve. The masseter muscle is exposed and separated from the mandible. The muscles are then stripped from the lateral aspect of the angle and ramus of

3. Schaefer, J. E. Correction of malocclusion by surgical interference. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 27:172 April 1941.

4. Kostecka, François. Surgical correction of open bite. 8th Congrès Dentaire International Sect. XII p. 241, 1931.

5. Verne, Daniel; Polacheck, Richard, and Shapiro, D. N. Osteotomy of condylar neck for correction of prognathism: study of fifty-two cases. J. Oral Surg. 15:183 July 1957.

6. Robinson, Marsh. Prognathism corrected by open vertical condylotomy. J. South. California D. A. 24:22 Jan. 1956.

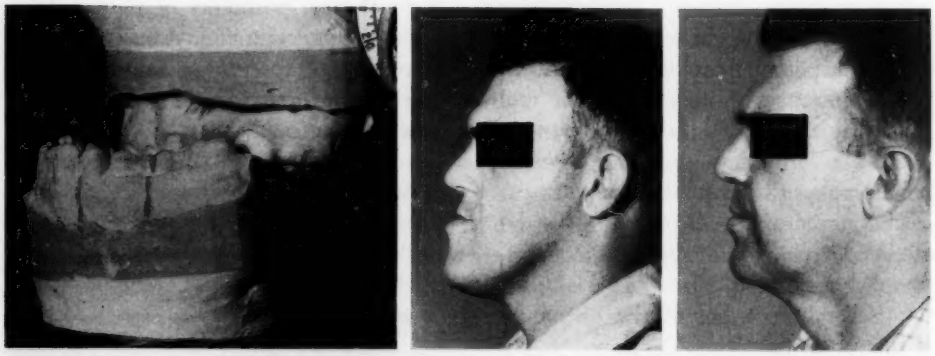

Fig. 1—Left: Models of patient with severe prognathism easily corrected by subcondylar osteotomy. Distance involved 19 mm. Number of millimeters does not always give true impression of extent of correction as arches of different patients vary considerably in size. Center: Preoperative view. Right: Postoperative view showing minimal scar at angle of mandible and re-establishment of gonial angle

the mandible to expose the coronoid process, sigmoid notch and condyle. Retraction is achieved by means of U. S. Army retractors. Vision is obtained with a headlight. Through this small incision the entire lateral aspect of the ramus can be visualized adequately.

Drill holes are made on a line extending obliquely from the sigmoid notch to a point just superior to the angle of the mandible. No. 8 round burs are used with a straight handpiece. The drill holes are extended, a groove is cut and the osteotomy cut is finished with an osteotome. The masseter and internal pterygoid muscles are separated from the posterior fragment sufficiently to allow lateral placement of the posterior fragment over the anterior fragment. The same procedure is carried out on the opposite side.

Direct wiring of the fragments has not been done and does not seem to be necessary. Verne and co-workers have demonstrated by their work with dogs that these fragments heal well, cortex to cortex.

The teeth then are placed in occlusion, and the wound is closed in layers, using no. 000 chromic catgut on the muscles and subcutaneous tissue and no. 0000 nylon interrupted in the skin. No drains are placed. A moderate pressure dressing is applied.

With increasing experience at the University of Texas Dental Branch, this procedure has been found to be simple and to have few or no complications. As stated before, the hazard of open bite is felt to be eliminated entirely. Because of direct vision there is no danger of uncontrolled bleeding as is seen occasionally with the Gigli saw. These patients are immobilized with dental arch bars, such as are used in fracture treatment, for six weeks only.

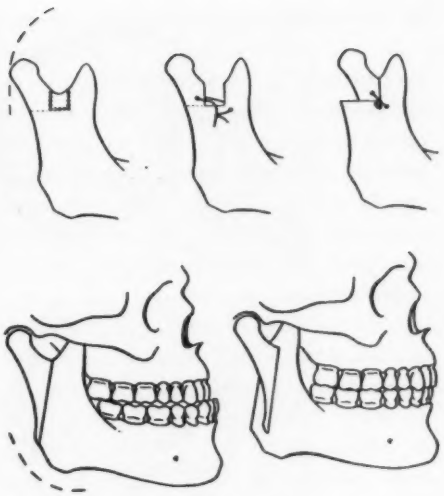

Fig. 2—Above: Sub-sigmoid notch ostectomy developed by Smith. Operative field is approached through preauricular incision. Below: Open subcondylar osteotomy. Operative field is approached through submandibular incision

The scar is in line with the natural skin lines of the neck. Because of its small size it is inconspicuous, and no additional incision is necessary over the zygomatic region as with the Gigli saw technic.

Dingman's[7] objection to the blind subcondylar osteotomy has been the following: (1) inability to control proximal fragments, (2) possibility of injury to the seventh nerve, (3) possibility of injury to the internal maxillary artery, and (4) disadvantage of muscle imbalance. The first three are corrected by this procedure be-

7. Dingman, R. O. Surgical correction of developmental deformities of the mandible. Plast. & Reconstr. Surg. 3:124 March 1948.

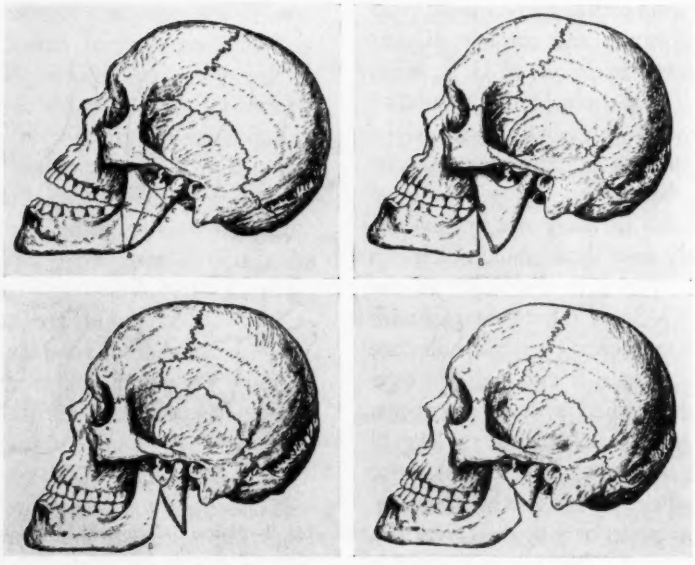

Fig. 3—Various methods of performing osteotomy in ramus of mandible as described by Babcock

cause of direct access. The last objection has been fairly well disproved, as demonstrated by the many successful cases reported by Smith and Robinson,[8] Kazanjian,[9] Reiter and his group.

■ *Discussion*

This technic has been used on 12 patients. No complications such as hematoma, nerve damage or open bite have arisen. This procedure can be carried out rapidly, the more recent procedures having been performed in two hours or less.

This procedure is suitable for edentulous patients and has been used for three patients of this type. Modified Gunning splints are used for immobilization. The maxillary splint is wired to the zygomaticomaxillary process; the mandibular splint is fixed by three circumferential wires. The splints are then attached to each other by intermaxillary elastics (Fig. 4). This has been found to be very satisfactory, causing the patient no discomfort and requiring no chin sling. In two instances some deviation of the mandible was involved as well as prognathism, and the condition has been corrected without complications.

The question of age has been raised in the past. Harrigan[10] has reported correction of prognathism in a 14 year old

8. Smith, A. E., and Robinson, Marsh. Surgical correction of mandibular prognathism by sub-sigmoid notch ostectomy with sliding condylotomy: a new technic. J.A.D.A. 49:46 July 1954.

9. Kazanjian, V. H. Symposium on maxillofacial surgery; surgical treatment of prognathism; analysis of sixty-five cases. Am. J. Surg. 87:691 May 1954.

10. Harrigan, W. F., and Biederman, W. Symposium on maxillofacial surgery; surgical and orthodontic approach to prognathic mandible. Am. J. Surg. 87:701 May 1954.

patient by means of bilateral ostectomy of the body of the mandible. Kazanjian has stated that if patients in this age group need correction it should be made by means of ostectomy of the body of the mandible. The reason for this is not clear. At the University of Texas Dental Branch it is felt that in certain instances a subcondylar osteotomy might be indicated. Consequently, having obtained repeated cephalograms at eight month intervals of a 14 year old patient, and having observed no change in the growth over that period, a subcondylar osteotomy was performed. This patient has been followed for five months after surgery with no evidence of change (Fig. 5). However, such early corrective surgery may be complicated by recurrences, and extensive studies should be carried out before embarking on such a venture. In general it is contraindicated prior to completion of skeletal growth. This particular patient was already taller than her two older sisters, and it was felt that she may have reached the extent of her growth.

Certain differences in the technic used by Robinson and that used in the clinics at the University of Texas might be mentioned. Robinson makes his osteotomy cut with a nasal saw. He recommends use of an interdental splint and a 1.5 mm. overcorrection of the prognathism. At the University of Texas the splint or the overcorrection has not been found necessary. As a matter of fact, it is felt that by not using splints there may be some improvement in the occlusion during the six weeks' healing period. None of the patients have required orthodontic treatment, although orthodontic or prosthetic consultation is obtained on all patients prior to treatment.

In the beginning this procedure was somewhat difficult and required longer hospitalization, the first three patients being kept in the hospital eight, six and five days respectively after the surgical procedure. At the present time, the patients are being dismissed on the third or

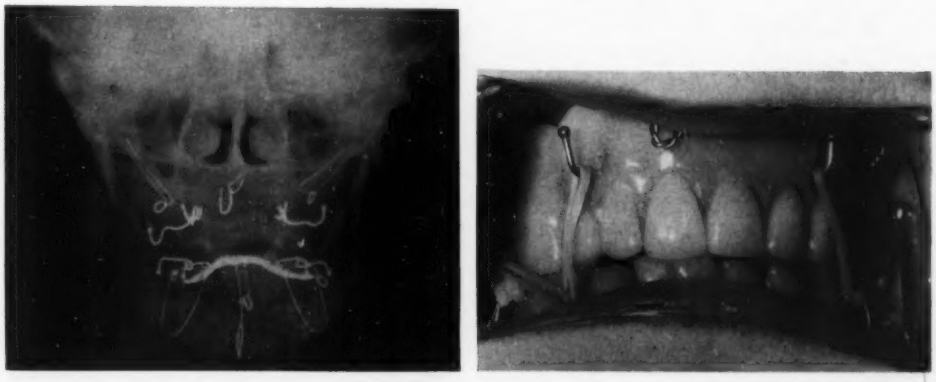

Fig. 4—Left: View after osteotomy showing present method of fixation. Two-piece Gunning splints attached to mandible by circumferential wiring and to maxilla by direct wiring of splint to right and left zygomaticomaxillary pillar. Nasal wires were inserted but were found to be unnecessary in fixation. Right: Splints wired in place. Intermaxillary fixation attained by rubber elastics

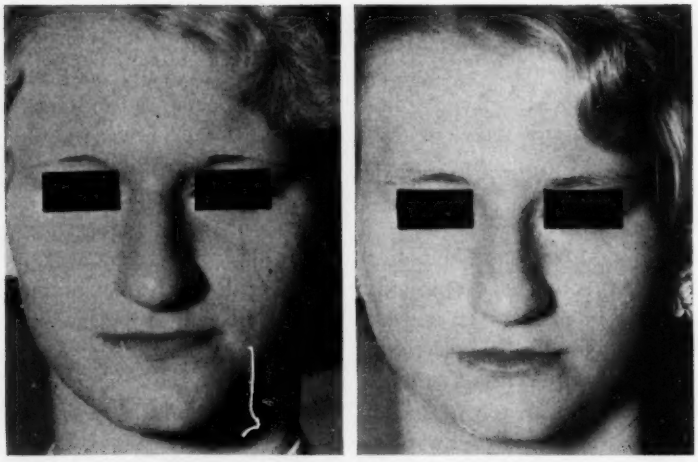

Fig. 5—Left: Preoperative view of 14 year old girl with prognathism. Right: Postoperative view of patient. Patient has shown no increase in growth over 13-month period

fourth postoperative day. Antibiotics are not given unless intraoral surgery, such as is necessary with edentulous patients, is carried out at the same time. Where teeth are present, arch bars are applied with the patient under local anesthesia the day before surgery.

■ *Summary*

A brief review of the development of the subcondylar osteotomy has been presented. The procedure as described is an open operation carried out through a small submandibular incision. The facial nerve is identified and retracted from the surgical field, and the vertical ramus of the mandible exposed. The osteotomy is extended obliquely from the sigmoid notch to a point just superior to the angle of the mandible. The proximal fragment is positioned lateral to the anterior fragment. Teeth are placed in occlusion and the mandible immobilized for a minimum of six weeks.

Experience at the University of Texas indicates that this is the procedure of choice for the correction of prognathism, and to date we have had no complications in the patients in whom we have used this procedure.

Prognathism corrected by open vertical subcondylotomy

■ *Marsh Robinson, D.D.S., M.D., Santa Monica, Calif.*

In mandibular prognathism there is no discrepancy between the sizes of the maxillary and mandibular arches. Therefore, some form of surgical correction in the ascending rami appears to be the most physiological approach that can be made.

Since Kostecka[1] in 1931 proposed the vertical subcondylotomy by a blind approach, a great number of operations have been performed. It appeared to me that theoretically the site of osteotomy was correct, as the muscle pull would not tend to disrupt the fragments. The vast experience with subcondylar overriding fractures treated conservatively (even though intermaxillary relationship changed) shows that healing is uneventful. The only drawbacks appeared to be the result of a blind procedure.

For these reasons in 1954 the first operation was performed using the open approach. After surgical procedures on five patients had been performed, a preliminary report was published.[2] Other surgeons now are using this procedure and are reporting good results. Since I used this procedure on the first patient, I have used the method on 34 patients and my residents, on 9 patients. The uniformly good results prompted the reporting of this new procedure for consideration as one method for the surgical correction of mandibular prognathism.

■ *Preoperative Treatment*

Study models are made. If the patient is to have postsurgical orthodontic treatment, the orthodontist is requested to mount the models in an arbitrary postoperative position from which he would like to start his orthodontic correction. If the patient is to have dentures constructed after surgery, then the prosthodontist can mount the study models to the desired ridge relationship and without regard to the teeth. In other patients the surgeon can determine arbitrarily the optimum intermaxillary relationship. Occasionally some selective spot grinding on the models will aid in this study.

Working models then are mounted in an overcorrected position. The mandibular cast is placed 1.5 mm. in posterior overcorrection and 1.0 mm. of open bite in the second molar region. The laboratory now can process a small occlusal acrylic splint to allow for definite stabilization in this overcorrected position.

During these preoperative visits the patient should be instructed in corrective tongue-swallowing exercises. The patient

Professor of oral surgery, University of Southern California School of Dentistry and assistant professor of oral surgery, University of Southern California School of Medicine.

1. Kostecka, François. Analyse critique de la thérapeutique chirurgicale des anomalies d'occlusion. 8th Congrès Dentaire Internationale Sect. XII p. 235, 1931.

2. Robinson, Marsh. Prognathism corrected by open vertical condylotomy. J. South. California D. J. 24:22 Jan. 1956.

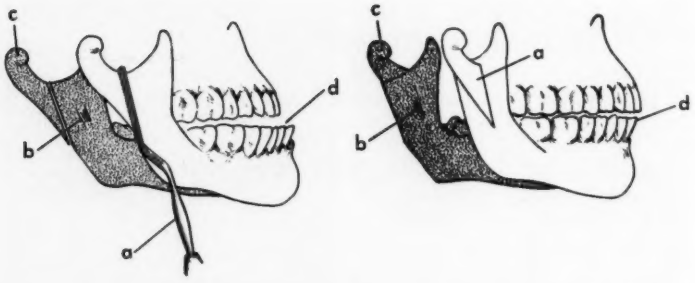

Fig. 1—Left: Mandible before surgical procedure. a, saw in position for condylotomy. b, mandibular foramen. c, condyle. d, protrusion of lower teeth. Right: Mandible after surgical procedure. a, condylar fragment lateral to ramus. b, mandibular foramen. c, condyle. d, corrected occlusion

locates the papillae of the submaxillary gland orifice with the tip of the tongue. With the tip of the tongue turned down in this manner, the patient drinks a glass of water. This forces the body of the tongue to thrust upward against the palate. The patient should practice this morning and night, and these exercises should be carried into the postoperative period.

All tests indicated by the observations in the history, physical and roentgenographic examinations are carried out. Arch bars are placed a day or two before the surgical procedure.

■ *Surgical Technic*

On the right side, an incision approximately 3 to 4 cm. in length is made about 1.5 cm. below the angle of the right side of the jaw in a skin line or parallel to a wrinkle. The skin and subcutaneous tissue and platysma muscle are divided. The tissues beneath the platysma muscle are divided by blunt dissection down to the periosteum of the lower border of the mandible and angle. A nerve stimulator is used intermittently to identify the mandibular branch of the facial nerve so that it can be retracted superiorly without damage.

The periosteum is elevated from the lateral surface of the ramus until the anterior base of the condyle and mandibular notch are identified. With the use of a nasal saw, a subcondylar osteotomy is made from the deepest portion of the notch to a point 1 to 3 cm. above the angle on the posterior border (Fig. 1, left). After division, slight pressure on the chin starts the ramus in a posterior direction, and the condylar fragment is kept laterally. The wound is closed temporarily. A similar procedure is carried out on the left side.

At this point the acrylic intraoral splint in the postoperative occlusal position is inserted between the dental arches and fixed by three intermaxillary wires. The wounds are opened again to see that there was good contact of bone and that the proximal fragment is lateral to the distal fragment (Fig. 1, right).

The deeper structures are closed with vertical, mattress type, no. 0000 chromic gut sutures. The skin is closed

with a no. 35 stainless steel subcuticular removable wire suture. A bulky collar type bandage is placed.

Postoperative care is similar to that given in instances of fracture. The subcuticular wire is usually removed between the seventh and tenth day. The intermaxillary fixation is discontinued after the seventh week. If the patient is not to have the services of an orthodontist or prosthodontist, the oral surgeon should see that the patient continues with the tongue-swallowing exercises and that selective spot grinding of occlusal interference is accomplished.

■ *Abbreviated Case Reports*

Cases 5, 10 and 15 were selected arbitrarily because of space requirements.

CASE 5—A 42 year old white carpenter (Fig. 2, left and center) was referred from New Mexico for surgical correction of his mandibular prognathism preparatory to making complete dentures. Examination revealed a well patient with a mandibular prognathism of 1.1 cm., that is, the mandible was 1.1 cm. anterior to intercuspation position as measured on the models. His remaining teeth had severe horizontal alveolar resorption.

On September 26, 1955, the surgical procedure was performed in the manner described, except that on the right side an interosseous wire was used. The splint provided an overcorrection of only 1 mm. (Fig. 3, right). The patient was hospitalized for four days. The postoperative course was uneventful except that two weeks after the surgical procedure he had an acute abscess of the lower right third molar which did not respond to antibiotic therapy. The tooth had to be extracted. The postoperative mandibular position one week after removal of the intermaxillary wires on November 5 was in the anticipated relationship. The patient returned to New Mexico, where his dentist decided to make maxillary and mandibular partial dentures.

He was seen last on April 6, 1957 (Fig. 3), at which time there was adequate jaw opening and there were no complaints referable to the jaws. The two partial dentures were functioning satisfactorily. No clinical difference could be

Fig. 2—Case 5. Left: Preoperative view of patient September 10, 1955. Center: Preoperative view of occlusion September 10. Right: Intermaxillary splint

Fig. 3—Case 5. Left: Postoperative view April 6, 1957. Right: Postoperative view of occlusion April 6

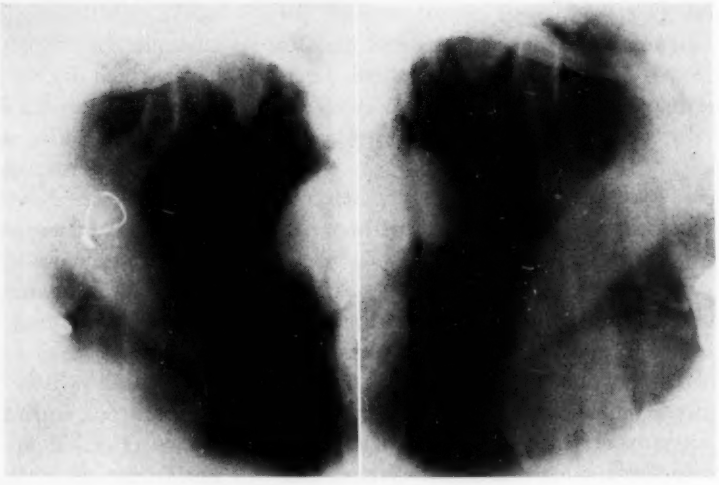

Fig. 4—Case 5. Left: Postoperative view of right temporomandibular joint with mouth open, April 6, 1957. Right: Postoperative view of left temporomandibular joint with mouth open, April 6

found between the right side which had had an interosseous wire and the left which had had no wiring. Roentgenograms showed normal healing (Fig. 4).

CASE 10—A 44 year old man was referred for surgical correction of a 25 mm. prognathism. His natural teeth were in poor condition but the intermaxillary relationship of the ridges precluded the construction of successful dentures. The splint was constructed to give the most favorable ridge relationship for dentures with no regard for tooth articulation. On February 28, 1956, the corrective surgery was performed in the manner previously described.

The patient made an uneventful recovery. The remaining teeth were extracted and dentures constructed. The patient was seen last on January 19, 1957. He had no complaints, and the roentgenograms showed normal healing.

CASE 15—A 27 year old white woman was referred by her plastic surgeon for correction of mandibular prognathism before a corrective rhinoplasty. Five Ivy

loops were placed on each arch prior to surgery. On July 10, 1956, her mandibular prognathism was corrected in the manner described. The collar bandage was removed on the third postoperative day, and the patient left the hospital on the fifth day. The subcuticular wire was removed on the tenth postoperative day. She returned to work on the fourteenth day. On September 19 a minimal amount of spot grinding was done on interfering bicuspid cusps.

The patient was seen last on June 26, 1957, and had no complaints. She stated that the plastic surgeon had corrected her nasal deformity in February.

■ *Comment on Method*

A detailed comment on the method has been published in a preliminary report.[2] Some further comment is in order.

It is thought that in each instance the condition should be overcorrected 1.5 mm. in retrusion and 1.0 mm. in posterior open bite. This is easily accomplished by the use of the occlusal splint. The splint also is necessary in most instances to give stability.

Prior to Case 5 interosseous wires were used bilaterally in two patients. It was found to be unnecessary as shown by Cases 5 to 43. The condylar fragment should be kept lateral to the ramus. This can be done easily by an open operation.

It should be emphasized that this is an operation to correct intermaxillary relationship. As such, it is imperative that the surgeon have a knowledge of occlusion. It is felt that the division of this subcutaneous bone through a Risdon approach is a minor problem compared to the determination of the final postoperative intermaxillary relationship.—*3003 Santa Monica Boulevard.*

■ Language of Peace

Peace is the common language of the day, which governments everywhere, irrespective of any concealed motivations and designs, must speak to their people. Although the will of the peoples of the world is for peace, the means of welding that will into irresistible strength across barriers of nationalism and through impenetrable curtains, the language of peace is not readily discernible. Men, however peace-loving, may be called upon to engage in battle. In authoritarian societies, they may readily be led into war by their governments. In free societies, they may find themselves under the compulsion of waging war, even though reluctantly, in order to protect and preserve their liberties. Nor can it be ignored that nations and peoples, free otherwise, could merely blunder into war through fear and hysteria or failure to understand and employ the available instruments of peace.—*Ralph J. Bunche.*

Evaluation of hydrocortisone in prevention of postoperative complications after oral surgery: a preliminary report

■ *Russell Ross,* D.D.S., Seattle, and Charles P. White, D.D.S.,† Staten Island, N. Y.*

Since one of the earliest attempts to treat patients with adrenocortical hormones was reported by Osler in 1896, a succession of discoveries and improved methods of isolation have opened a new front in the management of many human ailments. More than 30 active and inactive crystalline steroids have been isolated from the adrenal cortex since 1930. Cortisone was isolated by three independent groups of scientists in 1936. Reichstein prepared hydrocortisone in 1938, and aldosterone was isolated by Simpson, Tait and Reichstein in 1953.[1]

■ *Chemistry and Pharmacologic Action*

The adrenocortical steroids are closely related chemically to cholesterol. In general, certain characteristic structural arrangements denote their individual physiologic activity. Approximately seven of these steroids have shown significant therapeutic value. Since cortisone, hydrocortisone, and aldosterone were successfully synthesized, other potent steroids have been developed which may prove to be of even greater therapeutic use.

The steroids have a broad scope of physiologic activity: the regulation of water and electrolyte balance; effects on the intermediary metabolism of carbohydrate, fat, and protein; control of neuromuscular activity; effects on secretory regulation; anti-inflammatory and anti-allergic action; and the regulation of cellular components of the blood and lymphoid tissues.

These substances have been classified into three general groups, according to their most characteristic biological activity. The mineralocorticoids, group one, are chiefly active in maintaining electrolyte balance. (In this group are desoxycorticosterone and aldosterone.) Group two, the glucocorticoids, are most active in the metabolism of carbohydrate, fat, and protein, and have many anti-inflammatory properties. (Cortisone, hydrocortisone, prednisone, and prednisolone are prominent in this group.) The third group consists of low potency sex hormones. Since this study is concerned with the anti-inflammatory properties of these substances, the discussion herein will be limited to a review of the pharmacological activity of cortisone, hydrocortisone, and

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*Senior staff member, dental service, USPHS Hospital.
†Chief, dental service, USPHS Hospital.

their recent synthetic derivatives.[2]

In 1949, Hench and his associates discovered that the signs and symptoms of rheumatoid arthritis could be relieved by the administration of cortisone. Since that discovery, the steroids have been used in the management of palliation of over 50 clinical conditions with inflammatory and allergic manifestations. Their therapeutic action has, in some measure, borne out the general adaptation syndrome as proposed by Selye[3] which describes the role of the adrenal gland in relation to all varieties of stress. It has been shown that the adrenalectomized animal has little resistance to mechanical trauma, cold, and toxic agents.

According to the present concept of the phenomenon of inflammation, injured tissue cells liberate chemical substances which may be responsible for the typical manifestations of inflammatory reaction. Two such substances are leukotaxine and the leukocytosis-producing factor (L.P.F.). Leukotaxine produces the increased permeability of the small blood vessels and the subsequent migration of the polymorphonuclear leukocytes into the region of the injury. The leukocytosis-producing factor (L.P.F.) initiates the release of leukocytes from the bone marrow, which explains, in part, the characteristic leukocytosis associated generally with inflammation.

Studies by Menkin, 1940 to 1942, indicated that cortisone suppressed the increased permeability of the small blood vessels produced by leukotaxine. It was also demonstrated that corticosteroids greatly inhibited cellular activity, as measured by the occurrence of cell division. The objective of Menkin's[4] later study, reported in 1954, was to determine if hydrocortisone would suppress significantly the activity of injured tissue cells in liberating leukotaxine and the leukocytosis-producing factor (L.P.F.). This study in dogs indicates that hydrocortisone's anti-inflammatory activity is on a cellular level. In essence, hydrocortisone appears to alter the activity of the injured tissue cell so that it becomes less capable of liberating the chemical agents involved in producing the phenomena of inflammation. At present, it is felt that the anti-allergic properties of the corticosteroids are dependent on this alteration in the cellular response to tissue injury, rather than interference with the reaction between antigen and antibody.

Because of the corticosteroid's multiplicity of effects on so many vital functions in human physiology, a basic understanding of their activity is essential if they are to be used therapeutically. The gamut of untoward side effects includes diminished resistance to infection; hypertension and hyperglycemia; hypochloremic-hypokalemic alkalosis; perforation of gastrointestinal ulcers; amenorrhea, hirsutism, and acne; psychosis with euphoria and mental instability; and hemorrhagic phenomena.[5]

Insofar as the use of the steroids in this study is concerned, the moderate

1. Williams, R. H. Textbook of endocrinology, ed. 2. Philadelphia, W. B. Saunders Co., 1955.

2. Goodman, Louis, and Gilman, Alfred. The pharmacological basis of therapeutics, ed. 2. New York, Macmillan Co., 1955.

3. Selye, Hans. The physiology and pathology of exposures to stress. A treatise based on the concept of the general-adaptation-syndrome and the diseases of adaptation. Montreal, Acta, Inc., 1950.

4. Menkin, Valy. Anti-inflammatory mechanism of hydrocortisone. Science 120:1026 Dec. 1954.

5. Cosgriff, S. W. Thromboembolic complications associated with ACTH and cortisone therapy. J.A.M.A. 147:924 Nov. 3, 1951.

dosage and the short period of administration largely obviate the development of most of the afore-mentioned side effects. However, this does not preclude the necessity of evaluating the patient's physical status prior to the administration of these agents. Their use generally is contraindicated if active or latent tuberculosis, diabetes, active peptic ulcer, hypertension, congestive heart failure, azotemia, or hemorrhagic diathesis[1] are present.

■ *Objective*

The removal of completely or partially impacted mandibular third molars that require the preparation and retraction of a mucoperiosteal flap and the removal of bone is a traumatic procedure which frequently is followed by edema of varying amount, discomfort to the patient, trismus and, at times, delayed healing. Inflammatory reactions *per se* are known to be purposeful defensive mechanisms on the part of the body; however, the products of such a reaction sometimes can be in excess, and consequently present the problems sometimes encountered postoperatively in these procedures.

It was postulated that the previously mentioned pharmacologic and physiologic activity of steroids in a small, but yet physiologic dosage, in a semicontrolled environment, might be of value in allaying these postoperative complications, and consequently this double blind study was devised to test the validity of this postulate.

Shafer[6] used 2.5 mg. intramuscularly of cortisone acetate daily when he removed the maxillary first molars from rats, and he demonstrated no retardation of healing in ten days, with no interference in bone formation. This study may not be significant, however, because these rats showed a certain resistance to cortisone. Many studies[7-9] have been carried out using antihistaminics for this purpose, but the results have been conflicting, inconclusive and doubtful. It was felt that perhaps a new avenue of approach might be useful.

In this study, it was originally planned to use at least 100 patients having impacted mandibular third molars, the removal of which would entail a certain amount of operative trauma. To date, 61 patients have participated in this study.

■ *Procedure*

The plan of procedure was discussed with the departments of pharmacy and medicine and arrangements were made for the dispensation of the medication and the examination of any patients in whom a history contraindicating the possible use of steroids was elicited.

A procedure for administration of the medication through the pharmacy, with one person keeping all of the records confidential, was arranged. The hydrocortisone and the placebos were made up in identical capsule form and neither the observer nor the operator knew which medication each patient received.

The authors decided to use hydrocortisone instead of cortisone because the

6. Shafer, W. G. Effect of cortisone on the healing of extraction wounds in the rat. J. D. Res. 30:4 Feb. 1954.

7. Macchia, Angelo F. Antihistamines and their value in allaying postoperative distress in the removal of impacted teeth. Oral Surg., Oral Med. & Oral Path. 10:122 Feb. 1957.

8. Baldridge, O. L., Jr. Effects of the antihistamine pyrrobutamine on soft tissue wound healing. J. Oral Surg. 13:183 July 1955.

9. Szmyd, Lucian. Clinical evaluation of an antihistaminic preparation in oral surgery. Oral Surg., Oral Med. & Oral Path. 9:928 Sept. 1956.

former was readily available, and because it is of slightly higher potency, requiring only 80 per cent the dosage of cortisone. The dose of hydrocortisone given was as follows, in 20 mg. capsules: (1) 40 mg. twice daily, the day preoperatively; (2) 40 mg. four times daily, the day of operation; (3) 40 mg. twice daily, the next two postoperative days.

An eosinophil count was performed on a peripheral blood sample from each patient before medication was begun, and this was repeated the day of operation. Any patient receiving hydrocortisone but not showing a 50 per cent drop in the eosinophil count was discarded from the study as not having a therapeutic blood level of the steroid for the purposes of the study. Thorn[10] and his group found that a fall in the peripheral eosinophil count is one of the most significant effects of the cortisones on the cellular elements of the blood. The magnitude of the fall varied with the dosage and route of administration. The oral route was found to be as effective as the intravenous route. They went on to postulate the possible mechanism of the occurrence based on: (1) inhibition of marrow production; (2) the segregation of cells in such organs as the lungs and spleen; or, (3) a direct destructive influence in the blood. A good control was had, therefore, in case a patient did not take his medication as prescribed. Eosinophil counts were performed on all patients before, and on the day of, surgery, so as not to distinguish the control from the experimental group.

It was decided not to use any ancillary medication such as antihistaminics, antibiotics, or other drugs which might add to, or detract from, the action of the steroids. If these had to be used, the patient was not included in the study. Sedatives were used when indicated preoperatively, and each patient was given six tablets of aspirin, phenacetin, caffein, with codein 30 mg. to take postoperatively if needed, as pain the first postoperative night was considered to be a normal reaction in all instances. Each operation was performed using the same anesthetic agent containing epinephrine 1:50,000, with local block anesthesia.

■ *Observations*

The following observations were made at the time of each procedure: (1) the length of time from the period the procedure began until the suturing was completed; (2) the amount of trauma to the patient, graded on a 1+ to 4+ basis; (3) the type of impaction; that is, complete, bony, incomplete, vertical, horizontal, and so on.

The fact should be stressed that each patient was selected only if it was felt that the impaction would require the preparation of a mucoperiosteal flap and the removal of bone with either bone burs or mallet and chisel. Any patient not requiring this amount of surgery was not included in the study. This point, and the factor of grading the trauma, are important, as no previous study has mentioned these factors. Also noted were the build of the patient, his complexion, age, and sex. An attempt was made to obtain as many patients as possible who needed the procedure bilaterally so that there would be a better test of the medication.

10. Thorn, George W., and others. Medical progress; pharmacologic aspects of adrenocortical steroids and ACTH in man. New England J. Med. 248:323 Feb. 19, 1953.

Table

Comparison of edema with trauma in both groups

Experimental group

Trauma	Edema				
	0 to 1 (slight)	1+ to 2 (moderate)	2+ to 3 (marked)	3+ to 4 (severe)	4+ — (extreme)
1+ to 2 (slight)	1				
2+ to 3 (moderate)	5	1			
3+ to 4 (marked)	9	2	1		
4+ — (severe)	7	9	3	1	

Control group

Trauma	Edema				
	0 to 1 (slight)	1+ to 2 (moderate)	2+ to 3 (marked)	3+ to 4 (severe)	4+ — (extreme)
1+ to 2 (slight)				1	
2+ to 3 (moderate)		2	3	2	
3+ to 4 (marked)		1	1	1	2
4+ — (severe)		3	6		

The patients were seen the next three postoperative days and were evaluated on the basis of: (1) edema or swelling on a 0 to 5 − basis; (2) pain, discomfort, or nausea; (3) trismus; (4) wound healing.

In using the hydrocortisone, the medical service felt that the steroids used in a relatively low dose for a relatively short period of time were safe.

■ *Results*

Sixty-one patients, 14 women and 47 men, ranging in age from 17 to 41, with a median age of 21, participated in this study.

Thirty-nine of the patients received hydrocortisone, and 22, placebos. The group who received the hydrocortisone will be called the experimental group, and those receiving the placebos the control group.

EDEMA—The table compares the control group with the experimental group and demonstrates several things concerning the reaction of the patients in terms of edema; trauma in each instance is compared with the corresponding edema. In the experimental group, 56 per cent of all the patients had slight edema; 30 per cent had moderate edema, 10 per cent severe edema, and none of the patients in this group showed an extreme reaction. The preponderance of patients in the experimental group showed a minimal to moderate response.

In the control group, none showed a slight or minimal response; 27 per cent

had moderate edema; 45 per cent had marked edema; 18 per cent severe edema; and 9 per cent had an extreme reaction. The preponderance of patients in this group showed a marked reaction.

In subjecting this data, insofar as edema as a reaction to surgery was concerned, to a statistical analysis, it was found that, using the chi squared method, a significant number of patients showed a response to the use of the hydrocortisone and had reduced edema, to make this result statistically significant.

Ten of the patients had the procedure done bilaterally, using one side as the control and the other as the experimental. All of these patients but one showed a diminution of edema from the control to the experimental side.

PAIN—To evaluate a subjective symptom such as pain statistically, a larger number of patients must be studied; however, to date, 65 per cent of the control group and 15 per cent of the experimental group complained of pain after the first postoperative night. In the group in whom the procedure was done bilaterally, none complained of pain on the experimental side after the first postoperative night, whereas four of this group complained of pain on the control side. These figures cannot be accepted as significant, however, until a larger series of patients has been studied.

TRISMUS—In the large majority of patients, trismus appeared to be reduced in the experimental group when compared with the control group; however, this reduction did not appear to be significant. There was little incidence of poor wound healing; it occurred only once in each group.

An interesting fact was discovered in the control group. Six patients of the control group were found to have a better than 50 per cent reduction in their eosinophil counts, and interestingly enough, all of these patients fell in the moderate edema group. This might be explained on the basis that Galante[11] and his co-workers indicated when they stated that during many minor surgical procedures some patients are stimulated through hypothalamic-pituitary-adrenocortical pathways to increase their secretion of steroids, of which 80 per cent in man is hydrocortisone.

■ *Discussion*

Several factors will have to be improved on to make this study more significant statistically. Although the response measured in terms of edema can be called significant at this stage, the equally important factor of pain will require a larger series of patients for accurate evaluation.

This study shows the possible value of the use of hydrocortisone in alleviating the sequelae after the removal of impacted mandibular third molars or other traumatic oral surgery procedures. It cannot be stressed too much, however, that these drugs should be used with care and that an adequate history must be taken in order to rule out any patients in whom there are contraindications to their use. Also it must be emphasized that this

11. Galante, M., and others. Symposium on total care of surgical patient; use of corticotropin, cortisone and hydrocortisone in general surgery. S. Clin. North America 34:1201 Oct. 1954.

is merely a preliminary report of a study which shall be continued, to evaluate further the apparent effect of hydrocortisone in the reduction of pain after oral surgical procedures.

■ *Summary*

A double blind study was carried out to evaluate the effect of hydrocortisone in reducing edema, pain, trismus and discomfort in certain patients who were chosen because of the traumatic aspects of the operations required. A statistically significant number of patients showed a reduction in edema when hydrocortisone was used. A trend appeared in the reduction of pain with the use of hydrocortisone, and the study is being continued to evaluate this factor further. The fact should be stressed that proper care and an adequate history must be taken when the steroids are used.

Treatment of tic douloureux with stilbamidine isethionate

■ *Albert A. Antoni,* D.D.S., M.Sc.D., and J. H. Johnson,† D.D.S., Toronto, Ontario, Canada*

Many kinds of treatment have been tried for the alleviation of tic douloureux. Alcohol injections, procaine injections and vitamin therapy have had variable and often unsatisfactory results. Nerve avulsions, sensory root resections, decompression operations and other forms of surgical intervention have been employed to alleviate the unbearable pain, but a safe, simple, effective and economical method of treatment has not yet been developed.

Encouraged by the works and published reports of Smith and Miller[1,2] and Woodhall and Odom,[3] we decided to employ stilbamidine isethionate, but in a manner slightly different from that of the original investigators. We have varied the dosage of stilbamidine isethionate for the individual patients in an effort to understand better the potentialities and action of this drug.

■ *Stilbamidine*

The aromatic diamidines have provided a number of very effective antibacterial agents and indeed it was the study of these derivatives that led Curd, Davey and Rose to develop the antimalarial drug

*Associate professor of oral surgery, Faculty of Dentistry, University of Toronto.

†Professor of oral surgery and head of the department, Faculty of Dentistry, University of Toronto.

1. Smith, G. W., and Miller, J. M. Treatment of tic douloureux with stilbamidine. Bull. Johns Hopkins Hosp. 96:146 April 1955.

2. Smith, G. W., and Miller, J. M. Stilbamidine and tic douloureux. J.A.M.A. 160:1431 April 21, 1956.

3. Woodhall, B., and Odom, G. L. Stilbamidine treatment of tic douloureux. (Abst.) J.A.M.A. 159:226 Sept. 17, 1955.

proguanil hydrochloride in 1944. Stilbamidine had been used previously in the treatment of the visceral form of leishmaniasis, early African trypanosomiasis and kala-azar and later by Schoenback and others[4,5] in the treatment of the fatal fungus infection, blastomycosis.

Stilbamidine isethionate is a white, odorless, crystalline powder which is freely soluble in water. Although it is stable in powder form, the solution of the drug deteriorates rapidly when exposed to light. It is claimed that a toxic by-product is formed that may be lethal if injected. The drug is highly irritating, and intramuscular injection produces local inflammation and pain. A concentrated solution given intravenously may produce thrombophlebitis.

Some of the side reactions due to its administration, as reported by its early users,[6-11] were a fall in blood pressure, a rapid and thin pulse, facial flushing, dizziness, salivation, syncope, lethargy, fecal and urinary incontinence and edema of the eyelids and face. These reactions, they maintained, all were transitory and tended to disappear within 10 to 30 minutes. However, a unique neuropathic syndrome involving the skin regions supplied by the sensory portion of the trigeminal nerve, resulting in progressive sensory changes with paresthesia and hypalgesia, also was reported. It was this late, chronic neuropathy that led investigators to apply it in the treatment of tic douloureux.

■ *Method of Administration*

The method of administration employed was similar to that used by Smith and Miller.[1,2] Stilbamidine isethionate, 0.15 Gm., dissolved in 200 cc. of a 5 per cent glucose solution in sterile distilled water was prepared just prior to administration and was given to the patient slowly by controlled intravenous drip. The solution was kept protected from the light by a brown paper bag, and the average period of administration was one hour.

The first patient was given one such injection daily for 14 days, the second patient received a similar injection daily for 12 days, and for the third patient the dosage was reduced to 10 daily treatments. The fourth patient had eight daily injections, the fifth and sixth patients received only five injections each and the seventh patient received six daily injections.

The drug was administered very easily in the dental office. The intravenous drip was started, and the patient relaxed and read a magazine during the administration.

All patients had pulse and blood pressure recordings before, during and after each treatment. At no time did we find any substantial variation in any of the patients. Corneal reflexes and pupil

4. Schoenback, E. B., and Greenspan, E. M. Pharmacology, mode of action and therapeutic potentialities of stilbamidine, pentamidine, propamidine and other aromatic diamidines; review. Medicine 27:327 Sept. 1948.

5. Schoenback, E. B., and others. Treatment of systemic blastomycosis with stilbamidine. Ann. Int. Med. 37:31 July 1953.

6. Krantz, J. C., and Carr, C. J. Pharmacologic principles of medical practice, ed. 3. Baltimore, Williams & Wilkins Co., 1954, p. 257-260.

7. American Medical Association. Council on pharmacy and chemistry. New and nonofficial remedies, 1955. Philadelphia, J. B. Lippincott Co., 1955.

8. Sen Gupta, P. C. Observations on neuropathic sequel of diamidino-stilbene in kala-azar. Indian M. Gaz. 78:537 Nov. 1943.

9. Fulton, J. D. Studies in chemotherapy; toxicity and therapeutic action of certain aromatic diamidines after exposure to light. Ann. Trop. Med. 37:48 April 1943.

10. Fulton, J. D., and Yorke, W. Studies in chemotherapy; increased toxicity of old solutions of stilbamidine. Ann. Trop. Med. 36:134 Sept. 1942.

11. Collard, P., and Nevin, S. Affection of the trigeminal nerve nucleus and central gray matter of the spinal cord following the administration of stilbamidine. Proc. Roy. Soc. Med. 40:87 Nov. 7, 1946.

Table • Data on patients with tic douloureux before and after treatment with stilbamidine isethionate

Age	Sex	Side of face	Div. of fifth nerve	Duration of symptoms (months)	Previous treatment	Longest previous interval free of pain (weeks)	No. treatments	Period from start of treatment to complete relief of pain	Interval free of pain since treatment (months)	Paresthesia	Recurrence of symptoms	Other reactions to drug
69	M	L	2 & 3	42	Teeth extraction Alcohol inj. Nerve avulsion	3	14	June 27, 1955 to October 9, 1955 (3 mo.)	24	Yes ****	Not yet	Severe itchiness Eyes badly affected —still persists
56	M	L	2	72	Teeth extraction Lidocaine inj.	2-4	12	October 20, 1955 to April 3, 1956 (5 mo.)	18	Yes ****	Not yet	Severe itchiness— still persists
36	F	R	3	36	Vitamin inj. Alcohol inj. Nerve avulsion Teeth extraction	Weeks at a time	10	October 31, 1955 to March 2, 1956 (4 mo.)	19	Yes ****	Not yet	Severe itchiness— still persists slightly
45	M	R	2 & 3	60	Alcohol inj. Vitamin inj. Teeth extraction	2-3	8	January 10, 1956 to May 6, 1956 (4 mo.)	17	Yes ***	Not yet	Itchiness— subsided
41	M	L	2 & 3	24	Teeth extraction Alcohol inj.	Few days at a time	5	May 28, 1956 to August 28, 1956 (3 mo.)	9	Slight *	Yes	Very slight itchiness
45	M	L	2	48	Teeth extraction Alcohol inj.	Periodic	5	June 25, 1956 to September 4, 1956 (2 mo.)	12	Slight *	Not yet	Hot flushes Faint feeling during injections
51	M	R	2	36	Teeth extraction	2-3	6	February 11, 1957 to May 28, 1957 (3½ mo.)	4	Yes **	Not yet	Slight itchiness

*Indicates degree of paresthesia.

dilation or constriction were not affected. One patient complained of a prickly sensation followed by a hot flush and then a dizzy feeling of faintness during the administration of the drug. This reaction proved to be purely transitory, and the patient recovered promptly.

■ *Results*

The table summarizes all the pertinent information on each patient's condition prior to treatment. It will be noted that they all had undergone various forms of previous treatment and that they all had had teeth removed in an ineffectual effort to eliminate their pain.

The table also gives detailed information on the treatment itself and the patients' reactions afterwards. It should be noted particularly that for the first few weeks after the treatment the patients' symptoms seemed to become more severe. This is a very distressing period for both the patient and the dentist, and careful psychological handling of the patient is vital at this time. However, the symptoms progressively subsided in all instances; by the fourth or fifth posttreatment month, the patients were all free from pain. The pain paroxysms were eliminated completely, and the patients had paresthesia over the entire area of distribution of the trigeminal nerve. There was no muscular dysfunction, and the eyes retained their normal reflexes and sensations.

It must be stressed, however, that a most untoward reaction occurred and proved very troublesome in those patients who had received 14, 12 and 10 injections respectively. The reaction took the form of an extreme pruritus over the distribution of the trigeminal nerve including severe itching and irritation of the eyes. For a time this syndrome was almost as distressing to the patients as their original pain. The pruritus was less pronounced and subsided earlier when a smaller number of injections was used.

■ *Discussion and Summary*

Seven patients suffering from tic douloureux were treated with daily intravenous injections of 0.15 Gm. of stilbamidine isethionate dissolved in 200 cc. of 5 per cent glucose in distilled water. All patients obtained relief from pain approximately four months after the first injection, even though the number of injections varied from as few as five to as many as 14.

All patients developed a chronic neuropathy in which various paresthesias of the superficial area supplied by the sensory branches of the trigeminal nerve were noted. No explanation is offered for this highly selective neuropathy. In those instances in which 14, 12, 10 and 8 injections were administered, there were definite untoward reactions. The severe anesthesia and extremely severe itching sensation along the entire sensory distribution of the trigeminal nerve, particularly the eyes, were gravely distressing. Indeed the pruritus was so distressing as to make the wisdom of the treatment debatable at times.

Up to date there has been recurrence of pain in only one patient; this patient had received only five injections and had been free from pain for nine months. For this patient a single supplementary injection has again given complete relief from pain.

The drug is very toxic and must be employed with extreme caution. Since as little as five injections cause cessation of pain without severe untoward itching it is possible that this drug may be effective in much smaller dosage than that advocated by the original investigators and that comfort may be maintained indefinitely by small supplementary injections.

From our observations to date it may be concluded that stilbamidine isethionate deserves the broadest possible investigation as an agent for the control of the pain of tic douloureux. Certainly it may prove to be a satisfactory palliative treatment for elderly patients for whom surgery may be contraindicated.

Serious reactions still are being reported after the administration of this drug. On investigation it is found invariably that the reactions have occurred when 0.15 Gm. of the drug has been injected relatively rapidly into the blood stream with a 10 cc. syringe. In our opinion such a method of administration is highly dangerous and should not be used. Instead, 0.15 Gm. of stilbamidine isethionate dissolved in 200 cc. of 5 per cent glucose solution should be given by intravenous drip requiring one hour for total administration. Additional clinical research is required for more precise evaluation of its role in the treatment of tic douloureux.

■ EFFICIENCY AND WISDOM

In our present society, there seems to be no lack of efficient people, but there is an almost complete absence of wisdom. It is not as if wisdom has become extinct. Rather, it has been abandoned as a social value—although it has the highest social value—and, therefore, many of us are living in fear and desperation, looking in vain for the purpose of our existence.—*Anton J. Carlson.*

Ameloblastoma of the mandible simulating a radicular cyst

■ *Gilbert S. Small,* D.D.S., Detroit; Carl W. Lattner,† D.D.S., and Charles A. Waldron,‡ D.D.S., M.S.D., St. Louis*

The ameloblastoma is probably one of the most interesting of all the odontogenic tumors. It has a variety of origins as well as interesting histopathologic features and can pose a difficult surgical problem. The epithelial origins of this tumor have been described by Thoma[1] as: (1) disturbances of the enamel organ or tissues forming it; (2) from cell rests of the enamel organ, either during development or later; (3) from the epithelium of odontogenic cysts; (4) from the surface epithelium; (5) from displaced epithelium in other parts of the body. Since Cahn's original paper in 1933,[2] numerous instances of ameloblastomas arising in dentigerous (follicular) cysts have been reported. On the other hand, development of an ameloblastoma from the epithelial lining of a radicular cyst appears to be exceedingly uncommon. One case was reported by Carpenter and Thoma[3] in 1933 in which an ameloblastoma was presumed to arise in the wall of a radicular cyst.

In the case to be reported herein, the clinical, roentgenographic and surgical observations were commensurate with a diagnosis of radicular cyst. Microscopic examination showed an ameloblastoma in the wall of the cyst. Although the cystic process was apparently completely enucleated at the initial operation, recurrence of the lesion was observed two and one half years later. Unfortunately the patient has refused further treatment after biopsy of the recurrent tumor. In spite of this, the clinical and histologic features are considered worthy of reporting.

■ *Report of Case*

On December 16, 1954, a 68 year old negro woman came to the Washington University Dental Clinic complaining of a "bad tooth." Intraoral examination revealed an expansion of the mandible from the lower right second bicuspid region to the lower right second molar region. This swelling could be visualized extraorally. There was no drainage or suppuration.

Periapical films revealed a well delineated radiolucency involving the lower right second bicuspid and extending off the film inferiorly. Lateral oblique and occlusal views showed a clearly demarcated oval shaped radiolucent area which extended from the lower second bicuspid to

*Department of oral surgery, Mt. Carmel Mercy Hospital.
†Associate professor of clinical oral surgery, Washington University School of Dentistry.
‡Professor of general and oral pathology, Washington University School of Dentistry.

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the lower second molar area. Inferiorly it appeared to involve the mandibular canal. There appeared to be a slight notching along the inferior border. A thin ramp of bone was seen at the superior aspect (Fig. 1). Occlusal films showed considerable expansion and thinning of the buccal cortical plate. The lingual plate was of normal thickness. The root portion of the second bicuspid was deflected buccally, and the crown was tipped lingually.

The patient had a low grade fever and was placed on a broad spectrum antibiotic and given an analgesic for pain. The next day, under lidocaine block anesthesia, an incision was made along the crest of the ridge from the second molar region to the cuspid. The mucoperiosteum was reflected and dissected from the cyst wall. A clear, straw-colored fluid escaped from the cyst and was aspirated. The cyst wall was enucleated with the second bicuspid attached. The remaining teeth were also extracted in preparation for full dentures.

After removal of the cyst it was noted that the superior wall of the mandibular canal was eroded which exposed the vessels and nerves. The sharp edges of the bone were smoothed and an iodoform gauze and balsam of Peru dressing was placed. Primary closure was obtained with six interrupted sutures. Basic postoperative instructions were given.

Gross inspection of the enucleated specimen showed a large thick walled cyst. The internal surface of the cyst appeared smooth and the specimen was submitted to the laboratory with a provisional diagnosis of radicular cyst. The bony defect was smooth walled with no evidence of invasion.

Fig. 1—Lateral oblique view showing extent of lesion. A slight notching is apparent at lower border

■ *Report of Pathologist*

Microscopic sections showed a lower bicuspid with a cystic membrane attached to the root apex. The pulp canal was visualized in some sections. It appeared to be devoid of viable pulpal contents. The periapical cystic structure consisted of a relatively thin fibrous connective tissue wall which contained scattered chronic inflammatory cells. The fibrous wall in most regions was lined by a thin layer of squamous epithelium which ranged from two to five cells in thickness. In one region the cystic wall showed considerable thickening. Within this region there were many islands of epithelial cells which showed a peripheral columnar arrangement. The central cells in some regions resembled stellate reticulum, whereas in others the central cells were squamous in type. Some of these regions showed microcyst formation. None of the sections examined showed any direct continuity between the islands of tumor cells and the lining of the large cystic space (Fig. 2). The diagnosis was ameloblastoma.

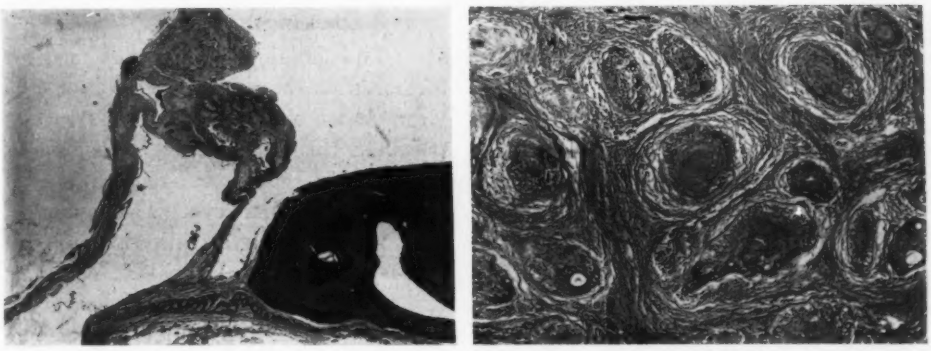

Fig. 2—Left: Low power photomicrograph showing root portion of second bicuspid and cystic membrane with thickened area containing ameloblastoma. Right: Proliferating islands of tumor cells with prominent acanthomatous features

■ *Postoperative Observations*

Since the observations made at the time of operation indicated that the entire region had been enucleated cleanly, further surgery was not advised at that time, and it was decided to keep the patient under periodic observation. Postoperative healing was uneventful except for slight paresthesia of the lower lip which was noted to be decreasing at each subsequent visit.

A postoperative view taken four months later showed apparent bony regeneration. Despite repeated attempts to contact the patient, she did not return to the clinic until April 29, 1957, nearly two and a half years after the original operation. Clinical examination showed a well healed alveolar process in the region of the previous surgery. The patient complained of a small region of remaining paresthesia of the lip and mild tenderness to pressure in the operative region. There was no expansion or deformity of the mandible. Lateral oblique and intraoral periapical films were taken. The wet reading of the lateral oblique view was considered negative. On the periapical films, however, an area of radiolucency suggestive of a delayed bone regeneration was seen in the area of the previous surgery (Fig. 3).

Because of the patient's complaint of tenderness, it was decided to explore the region and take a biopsy specimen. Block anesthesia was obtained with 2 per cent lidocaine with 1:100,000 epinephrine. An incision was made along the crest of the ridge from the second molar to the cuspid region, and the mucoperiosteum was reflected. This tissue was very adherent, and sharp dissection had to be used to obtain adequate exposure. The cortical bone had a spongy appearance. During curettage, a circumscribed region of fibrous appearing tissue was enucleated for biopsy. While this procedure was going on, the patient experienced pain in spite of signs of adequate block anesthesia. This pain could not be obviated by additional infiltration and block injections. A

Fig. 3—Periapical view taken two and a half years after original operation showing irregular radiolucent area

gauze dressing was placed in the small defect and it was closed with no. 000 cotton sutures.

Microscopic examination of the biopsy specimen showed islands of epithelial tumor cells growing in a dense fibrous stroma. The peripheral epithelial cells were columnar, whereas the central areas showed a definite acanthomatous change. In a few areas the central epithelial cells resembled stellate reticulum. The diagnosis was recurrent ameloblastoma, mandible. The histologic features in this biopsy were identical with the original tumor.

A review of the lateral oblique views showed an area of "smudged" radiolucency in the vicinity of the original defect. Considering the lapse of time since the original operation, this could probably be considered the extent of the recurrent tumor. It was felt that a local block resection of the involved region was indicated. The patient was seen one week after the biopsy. The nature of her tumor was explained to her carefully, but she refused all further treatment.

■ *Discussion*

The findings with this patient demonstrate the desirability of histologic examination of all cysts removed from the jaws. In this instance, the initial roentgenographic appearance suggested a diagnosis of radicular cyst. The operative observations and gross inspection of the cystic sac were also compatible with this impression. The true nature of the process was only discovered after microscopic examination.

The origin of this tumor must remain a matter of conjecture. Several possibilities may be considered. The first is that the tumor arose by proliferation of the epithelial cells lining a radicular cyst. The fact that the greater part of the cystic sac was found to be lined by two to five layers of flattened epithelial cells with no evidence of ameloblastic proliferation into the underlying fibrous wall supports this idea. The ameloblastoma was noted only in a thickened portion at one aspect of the cyst wall, and although there was no direct continuity between the squamous epithelial lining of the cyst wall and the ameloblastoma itself, it is possible to assume that this tumor arose directly from the epithelium of the cyst or from the epithelial rests within the cyst wall. The surgical specimen included the second bicuspid and the cystic sac which was sectioned *in toto*. The cyst wall, although closely approximating the apex of the root, was not attached to it in the manner usually seen in a radicular cyst. The pulpal tissues of the second bicuspid were seen on some of the sections and were noted to be degenerated. Although this does not prove that the lesion was originally a radicular cyst, it does lend some

measure of support to this contention.

A second possibility is that this lesion was a large monocystic ameloblastoma which arose centrally within the mandible and secondarily involved the apexes of several teeth to simulate a radicular cyst. The microscopic finding that a large portion of the cystic process was lined with flattened cells with no evidence of ameloblastoma in much of the cyst wall would tend to mitigate against this interpretation.

The third possibility to consider is that the patient had two separate lesions, a radicular cyst and an ameloblastoma, which collided during their growth.

The events in this instance also point out the necessity for careful and prolonged postoperative follow-up of patients with ameloblastoma. The hazard of recurrence of ameloblastomas occurring in odontogenic cysts has been noted before[4] and is seen in the case reported here. The recurrence rate of ameloblastoma, especially after curettage, is well known. Small and Waldron,[5] in an analysis of 1,048 cases reported in the literature, state that 352 patients were followed postoperatively. There was a total recurrence rate of 33 per cent. In those patients treated by curettage, there was a recurrence in 46 per cent, whereas in those treated by irradiation, there were recurrences in 72 per cent. There was only a 13 per cent recurrence rate after resection or hemisection. Unpublished analysis of a series of 31 instances of ameloblastoma treated by curettage showed recurrences in 17 patients, a recurrence rate of 45 per cent. This is in complete accord with the published data listed. Block resection, therefore, would seem generally to be the treatment of choice.

The inherent dangers of the use of the Partsch operation in the case described can be seen. This operation has been advocated for large cysts of the jaws. If such a procedure had been performed, even with histologic examination of a portion of the cyst wall excised for the "window," the diagnosis could easily have been missed.

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5. Small, I. A., and Waldron, C. A. Ameloblastoma of the jaws. Oral Surg., Oral Med. & Oral Path. 8:281 March 1955.

■ Science and Modern Civilization

Science is the great instrument of social change, all the greater in its effect because its main object is not change but knowledge, and its silent appropriation of this dominant function in our time of political and religious strife. Science is the most vital of all revolutions which have marked the development of modern civilization.—*A. J. Balfour.*

Treatment of human bites of the lip

■ *Daniel M. Laskin,* D.D.S., M.S., Chicago, and*
William B. Donohue,† D.D.S., Montreal, Quebec, Canada

Among the injuries which the oral surgeon occasionally may be called on to treat are human bites of the lip. Unfortunately, there has been little mention in the dental literature concerning the proper management of such injuries. In the medical literature, most reports of human bites have been devoted to those on the hand. Where facial injuries were included, generally no specific distinction was made between the treatment of such bites and those in other areas of the body. Because of the poor prognosis for infections resulting from bites of the hand, drastic forms of therapy, including extensive debridement and cauterization, have been advocated.[1,2] Obviously, application of these measures to the face would result in considerable disfigurement. It has been shown in the present series, however, that the uncomplicated healing of facial bites can be obtained without the use of destructive forms of therapy. Similar findings have been reported by Crikelair and Bates.[3]

The term "human bite" as used in this report is defined as a bite wound inflicted by one person on another, as distinguished from a self-inflicted injury. About 80 per cent of all human bites occur on the hands, with the remaining 20 per cent distributed over the rest of the body.[3] Of this latter group, the most common site is the head and neck region. In this area, the lips are most frequently involved, with the lower lip being injured more often than the upper. The cheeks, nose and ears are other regions commonly bitten. Generally, human bites are inflicted during fights. In the 52 instances reported by Crikelair and Bates,[8] 33 occurred during fights, 6 were accidentally sustained by children at play, and 2 resulted from sexual attack.

Several studies have been made of the bacteriology of human bites.[4,5] Among the organisms which have been isolated were anaerobic streptococci, staphylococci, fusiform bacilli, Vincent's spirochetes, occasional pathogenic actinomyces and diphtheroids. In some instances, syphilis has been transferred by the bite of a person with lues.[6] It is the infections which result from the implantation of this heterogeneous population of pathogenic organisms deep in the tissues that account for much of the seriousness of human bites.

*Associate professor of oral and maxillofacial surgery, University of Illinois College of Dentistry.

†Formerly resident, department of oral and maxillofacial surgery, Cook County Hospital, Chicago.

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4. Barnes, M. N., and Bibby, B. G. Summary of reports and a bacteriologic study of infections caused by human tooth wounds. J.A.D.A. 26:1163 July 1939.

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Table • Data on 14 instances of human bites of the lip

Case no.	Age: years	Sex	Site	Cause	Time prior to treatment	Type of wound*	Condition of wound	Treatment
1	36	M	Upper lip	Fight	4 hrs.	Class 3	Clean	Chlortetracycline; tetanus antitoxin Undermining and closure
2	54	M	Upper lip	Fight	13 days	Class 3	Infected	H_2O_2 dressings Penicillin; tetanus antitoxin Vertical V-section and closure, after elimination of infection
3	42	M	Upper and lower lip	Fight	3½ hrs.	Class 3	Clean	Penicillin Upper lip—vertical V-section and closure Lower lip—mucous membrane brought forward to cover defect
4	35	M	Lower lip	Fight	5 hrs.	Class 2	Clean	Chlortetracycline Flap repositioned and sutured
5	24	M	Lower lip	Fight	1 hr.	Class 2	Clean	Penicillin Flap repositioned and sutured
6	27	F	Lower lip	Sexual attack	2 hrs.	Class 3	Clean	Penicillin Horizontal V-section and closure
7	39	M	Lower lip	Fight	7 hrs.	Class 3	Clean	Chlortetracycline Vertical V-section with Burow procedure
8	26	F	Lower lip	Sexual attack	2½ hrs.	Class 3	Clean	Penicillin Horizontal V-section and closure
9	49	F	Lower lip	Fight	5 days	Class 3	Infected	H_2O_2 dressings Penicillin; tetanus antitoxin Vertical V-section and closure, after elimination of infection
10	28	M	Lower lip	Fight	2 hrs.	Class 1	Clean	Penicillin; tetanus antitoxin Primary closure
11	45	M	Lower lip	Fight	4 hrs.	Class 2	Clean	Penicillin Flap repositioned and sutured
12	21	M	Upper lip	Fight	3 hrs.	Class 1	Clean	Chlortetracycline; tetanus antitoxin Primary closure
13	31	F	Lower lip	Fight	4 hrs.	Class 2	Clean	Penicillin Flap repositioned and sutured
14	36	M	Lower lip	Fight	7 hrs.	Class 3	Clean	Penicillin; tetanus antitoxin Mucous membrane brought forward to cover defect

*Class 1—A puncture wound or linear tear; Class 2—The separation of a pedunculated flap of tissue; Class 3—The complete avulsion of an area of the lip.

■ *Treatment*

In the treatment of facial wounds, the concern is not only with the correction of the primary condition, but also with the esthetics of the final result. To accomplish these objectives, a series of human bites of the lips were treated by early primary closure in conjunction with antibiotic therapy. The success of this form of management suggests that human bites of the face can be handled in a manner similar to other facial lacerations.

Of the 14 patients included in this series, ten had bites of the lower lip, three injuries occurred on the upper lip and one patient had involvement of both lips (see table). With the exception of two patients (no. 2, 9), the average time which elapsed between the occurrence of the injury and

Fig. 1—Left: Human bite wound of the lower lip resulting in separation of a pedunculated flap of tissue. Center: Primary closure of the wound. Right: Appearance of lip three weeks postoperatively

the beginning of surgery was approximately three and one half hours. In the two in whom the condition was long-standing, it was necessary to eliminate the infection from the wounds before closure was attempted. These lesions were debrided of necrotic tissue and the patients were instructed to apply warm, 3 per cent hydrogen peroxide dressings several times daily. Antibiotic therapy was also given. Within about three days the wounds were covered with healthy granulation tissue and were ready to be repaired.

Anesthesia for surgical correction of the lip lesions was obtained by blocking either the mental or superior labial nerves with 2 per cent procaine containing 1:100,000 epinephrine. Local infiltration was avoided because the distortion which occurs hinders proper alignment of the tissues. The wounds were cleansed carefully with tincture of green soap and rinsed with a sterile saline solution. Finally, a 1:1,000 aqueous solution of benzalkonium chloride was applied.

Generally, by the time the patient came for care, active hemorrhage had ceased. In some instances, however, bleeding from the labial artery recurred during the cleansing procedure. This was controlled by clamping the vessel and tying it with no. 0000 catgut suture. Minor oozing was readily stopped with moderate pressure.

The technic employed for the repair of the lip wounds varied according to the extent of the injury. Three types of wounds were encountered: (1) a puncture wound or linear tear, (2) the separation of a pedunculated flap of tissue (Fig. 1), or (3) the complete avulsion of an area of lip (Fig. 2). The management of the first two types of wounds was not difficult since there was no tissue loss. The puncture wound or tear was simply closed in layers using catgut sutures in the deep tissues and fine silk or nylon sutures for the mucous membrane and skin. In the flap-type injury a similar technic was employed but considerably more care was necessary to assure proper alignment of the tissues.

The repair of defects of the lips presents a challenge to the ingenuity of the surgeon, and often variations or combinations of technics must be utilized to achieve the desired results. Before becoming involved in extensive reconstructive procedures, however, it is always advisable to approximate the parts manually to de-

Fig. 2—Left: Avulsion of tissue from both lips as a result of a human bite. Center: Primary repair of the upper lip after conversion of the lesion into a V-shaped defect. Lower wound was corrected by advancing oral mucosa outward. Right: Postoperative result one month later

termine whether a simple closure can be obtained. The elasticity of the lips permits considerable stretching without producing an obvious deformity. Many times this will allow for the simple correction of what at first may appear to be an extremely difficult defect to repair.

In general, one of two procedures was found to suffice in most instances. The method of choice was determined by the amount and location of the tissue loss. In relatively superficial defects, primary closure was usually effected by undermining the innermost edge of the wound and advancing the mucosa outward (Fig. 2, 3). To assure proper contour of the lip, some connective tissue and muscle were often included with the undermined portion of the mucous membrane. Distortion of the vermilion border was prevented by avoiding elevation of the outer wound margin.

Where extensive wounds were encountered, closure was accomplished by converting the lesion into a V-shaped defect. When the wound was located on the vermilion surface of the lip, the V was formed in a vertical direction (Fig. 2, 4, A, B). In order to conserve as much tissue as possible, the incisions were made as a continuation of the sides of the original wound. The excision extended through the full thickness of the lip. The wound was sutured in layers beginning with the musculature, then the tissues on the inner surface of the lip and finally the outer margins. Since it is essential for proper esthetics to maintain the continuity of the vermilion border, the first suture on the outer surface of the lip was always placed at that point.

When the defect was present on the anterior surface of the lip, the V was formed in a horizontal direction (Fig. 5, 6). This was accomplished by bringing the lateral margins of the defect together in the midline. Closure in this manner prevented the additional loss of tissue involved in the vertical V-excision and facilitated healing of the wound by avoiding the removal of an entire thickness of lip.

When considerable loss of tissue has occurred, primary closure alone may result in an extreme narrowing of the oral orifice. Under such circumstances a relatively normal sized lip can be re-established by means of the Burow[7] procedure (Fig. 4). An incision is made through the

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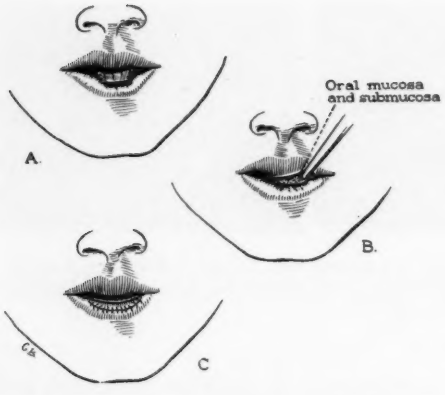

Fig. 3—Technic for correction of superficial defects of lip. A: Illustration of small flat defect of the mucous membrane surface of the lower lip. B: Undermining of oral mucosa. To maintain contour, submucosa and muscle may be included in flap. C: Flap sutured over defect

skin and subcutaneous tissues extending laterally from the corner of the mouth. From the ends of this incision two superiorly converging cuts are made through the whole thickness of the cheek to form a triangle (Fig. 4, A). The medial incision is placed in the nasolabial fold. The skin and muscle are removed from the triangle leaving only a flap of mucous membrane (Fig. 4, B). The skin lateral to the end of the lip is then excised in a region corresponding to the outline of the new vermilion to be formed, and the mucosal flap is trimmed and sutured into position in this region (Fig. 4, C). Finally both the cheek and lip defects are closed by approximation of their edges (Fig. 4, D). It was only necessary to resort to this technic once in this series. In that particular instance (no. 7, table), closure of the V-shaped defect alone was not feasible since approximately 3 cm. of the vermilion portion of the lip had been lost. The ultimate functional and cosmetic results obtained with this procedure were excellent.

After repair of the lip defects, tension was always removed from the incisions by pulling the cheeks medially with crossed strips of adhesive tape and the wounds were covered with a moderate pressure dressing (Fig. 7). All of the patients were placed on antibiotic therapy. In 10 of the 14 patients, penicillin was administered in intramuscular doses of 600,000 units on alternate days for one week. The remaining patients were given 250 mg. of chlortetracycline orally four times daily for a similar period. Six of the patients received 3,000 units of tetanus antitoxin preopera-

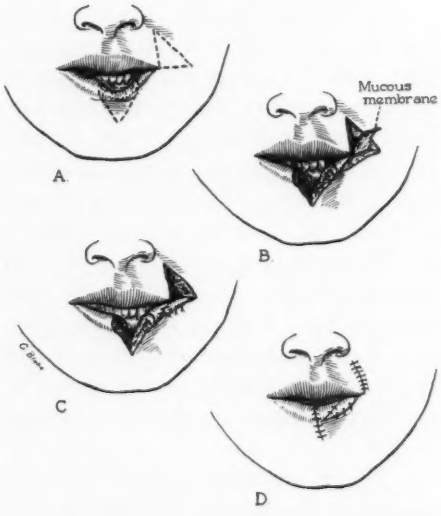

Fig. 4—Burow procedure for reconstruction of extensive lip defect. A: Outline of incisions to create a V-shaped defect and triangular cheek flap. B: Excision of V-segment and removal of skin and muscle from cheek flap. An area of skin corresponding to new vermilion zone has been excised. C: Positioning of mucosal flap to form new vermilion zone. D: Closure of lip and cheek defects

tively. The sutures were usually removed on the fifth to seventh day postoperatively. In all instances the wounds healed by primary intention and the ultimate cosmetic results were very good (Fig. 1, 2, 6).

■ *Comment*

The use of antibiotics has been an important factor in simplifying the management of human bites. Bacitracin, and penicillin alone and in combination with streptomycin or sulfonamides have been used successfully as supportive therapy.[8] In this series, most of the patients received only penicillin. Although none of the wounds showed evidence of infection postoperatively, it would seem that in view of the mixed bacterial population which occurs in human bites, antibiotics with a broader spectrum such as the tetracyclines would be preferable.

Lowry[2] has expressed the opinion that the administration of tetanus antitoxin is an unnecessary procedure since tetanus resulting from a human bite has never been reported. It must be remembered, however, that *Clostridii tetani* have been isolated as a contaminant in the oral cavity.[9] Moreover, Robinson and Laskin[10] have reviewed 16 instances of tetanus of oral origin. On the basis of these observations, use of the antitoxin or tetanus toxoid appears to be a wise precaution, particularly since many bites produce deep puncture wounds favorable to the growth of anaerobic organisms.

There are several reasons why primary closure of human bites can be performed more successfully on an area of the face, such as the lips, than in many other parts of the body. Perhaps the most important factor favoring rapid wound healing and the prevention of infections in this region is the abundant blood supply. Moreover, because of the extensive pathways for collateral circulation, injuries to these tissues are less likely to interfere with this vascular supply and thereby impair healing. It is also very likely that the lips, as a boundary of the oral cavity, develop a relative immunity to the endogenous bacteria of the mouth. Since a great number of the oral inhabitants are common to most individuals, the lips normally are resistant to many of the organisms implanted as the result of a human bite.

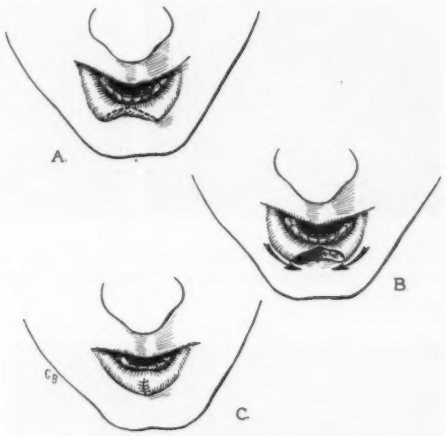

Fig. 5—Technic for correction of extensive defects on the anterior surface of lower lip. A: Outline of incisions for creating horizontal V-shaped defect. B: Stretching of tissue medially to effect a closure. C: Wound margins held in approximation by interrupted sutures

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9. Hall, I. C. Bacterial factors in pyorrhea alveolaris. J. Infect. Dis. 37:87 July 1925.

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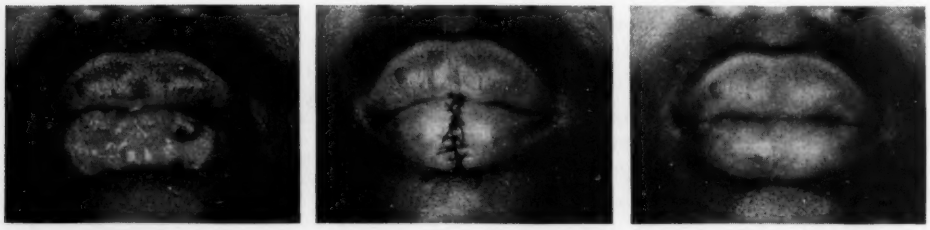

Fig. 6—Left: Extensive defect of lower lip caused by human bite. Center: Primary closure of the horizontal V-shaped defect. Right: Postoperative result six weeks later

Fig. 7—Use of pressure dressing to reduce tension on wound and decrease postoperative swelling. Folded gauze pads are placed over the lip and held in position by crossed strips of adhesive tape or elastoplast. A similar technic can be used for either upper or lower lip

Although the experience in this series has been limited to the lips only, it is reasonable to assume that primary closure also can be used successfully for bites in other regions of the face. A few such instances have been reported.[3,11,12] Similar treatment, however, probably is not applicable to bites of the hand because of the anatomic peculiarities in that region. Hand wounds generally involve the tendon sheaths. They occur when the hand is clenched and as the fist is opened, the tendon glides under the skin carrying contaminating organisms into a site which cannot be sterilized readily. With the exception of the puncture type of wound, most bites of the face are readily accessible to sterilization procedures. This factor very likely also contributes to the uncomplicated healing of such injuries.

■ *Summary*

A series of human bites of the lips were treated successfully by early primary closure and antibiotic therapy. This form of treatment is contrary to that commonly used for bites occurring in other regions of the body.

Three types of wounds of the lip were encountered: a puncture wound, separation of a pedunculated flap of tissue, and complete avulsion of an area of lip. Conservative management has been found to be satisfactory in most instances. Similar procedures probably could be utilized for human bites in other parts of the face.

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Loss of vertical dimension in tobacco chewers and its relation to Costen's syndrome

■ *Eugene J. Murphy, D.D.S., Clarksburg, W. Va.*

Diseases and disturbances of the temporomandibular joint are among the most obscure, baffling and controversial problems in medical science. The etiology of many of these phenomena is unknown, and there are numerous unsolved anatomic and functional aspects.

Every dentist encounters instances of temporomandibular joint disturbances similar to those first described by Costen[1] and Goodfriend[2] which are commonly known as Costen's syndrome. Costen felt that the dentist should be aware of such conditions and should also be capable of applying corrective measures.

It is certain that no one single factor is responsible for the syndrome. Obviously there are multiple causative factors, although it seems to be fairly well agreed by most investigators that malocclusion and disturbance of muscular balance usually cause temporomandibular joint dysfunction. From the anatomist's viewpoint, the breakdown of muscular balance is the first symptom of mandibular overclosure.[3] It is theorized that this is followed by a loss of normal relations between the condyle and the disk and that the end result is destruction of the disk and degenerative changes in the condyle and tubercle. This alteration of the anatomic structure brings on symptoms of local and radiating pain, restriction of mandibular movements and a snapping, cracking noise in the joint.

From a general standpoint, the loss of vertical dimension is frequently cited as one of the most frequent and obvious causes of the joint syndrome. Harris[4] pointed out the severe and painful symptoms brought about by overextension of the external pterygoid muscles through loss of vertical dimension. Burket[5] listed the decrease in intermaxillary space as a particular offender. Sicher[3] felt that the term "Costen's syndrome" with all its implications should be replaced with the diagnosis "temporomandibular deforming arthritis from mandibular overclosure or displacement." For many years Costen's syndrome was understood only in its relationship to the loss of vertical dimension or so-called "closed bite."

In connection with a study of temporomandibular joint disorders and diseases, the author has observed severe loss of vertical dimension in persons who have

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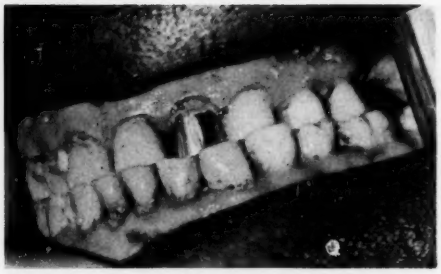

Fig. 1—Case 2. Gold crown has been ground off to level of other teeth

been life-long chewers of tobacco. Over five years, 100 patients were checked carefully at the Veterans Administration Hospital, Louisville, Ky. This was a fertile field for study because a great number of patients entering the hospital grew their own tobacco and chewed it as it came from the fields, without any commercial refinements of any sort.

In this study, only patients having a complete or almost complete natural dentition were considered; however, edentulous persons of this type are rare. It is also interesting to note that the incidence of caries, periodontal disease or gingivitis was very low. The average age of the patients in the group was 56.

In this series of patients, only four had any particular symptoms of temporomandibular joint syndrome. One, a 62 year old farmer, stated that he was getting deaf and he had mild pain in the joints. Another complained of pain and clicking noises when he chewed. The remaining two described joint pain apparently due to a generalized arthritic involvement.

These observations are not presented as an argument that loss of vertical dimension has no bearing on temporomandibular joint disturbances. On the contrary, many patients have been seen in whom severe symptoms were entirely eliminated or greatly ameliorated by the careful restoration of lost vertical dimension. It is merely submitted to illustrate that loss of vertical dimension does not necessarily produce joint symptoms.

■ *Report of Four Cases*

Four characteristic case reports follow.

CASE 1—A 58 year old white man had 26 teeth present. Approximately one third

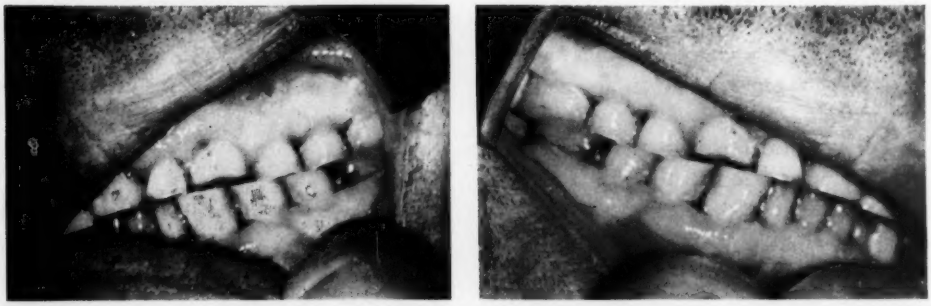

Fig. 2—Case 3. Concavity in posterior teeth can be seen, which is deepest at the center of the teeth

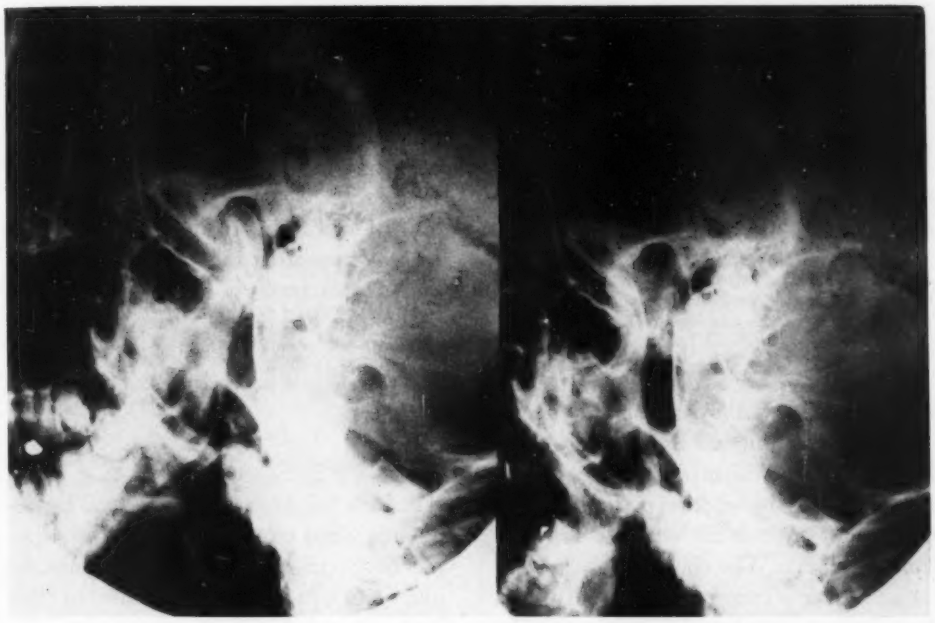

Fig. 3—Case 3. Views showing condyle in open and closed position

of the vertical height of both the upper and lower teeth had been ground away. The teeth were deeply stained and the incisal and occlusal surfaces were eburnated and had the appearance of polished ebony. There were no carious lesions, and the tissues appeared to be healthy and normal. There was no temporomandibular joint trouble. The patient stated that he chewed tobacco at all times except when he ate. He had been an inveterate tobacco chewer for about 44 years.

CASE 2—A 60 year old negro man had 24 teeth present. He stated that about four or five teeth had been kicked out by a mule when he was a young man. All the posterior teeth were present with the exception of the upper left molars. A gold shell crown on the upper left lateral incisor that had been placed some 30 years before had been neatly ground off to the level of the other teeth (Fig. 1). On removing the crown it was found that the tooth was free of caries with most of the enamel intact. The mouth was clean and healthy appearing with the exception of a few salivary calculus deposits which were stained black. The patient was positive that he had started chewing tobacco when he was about 10 or 11 years old. He had never had any temporomandibular joint difficulty.

CASE 3—A 56 year old white man had a complete dentition with the exception

Fig. 4—Case 4. Patient has shifted mandible laterally and the concavities which have been ground into the teeth can be seen

of the upper left third molar. The teeth of this patient differed from those of the first two described in that there was a definite concavity in the posterior teeth in contrast to the flat occlusal surfaces commonly seen. The concavity was deepest at the very center of the teeth (Fig. 2). The roentgenographic study, which was made in most instances, demonstrated the condition of the condyle in the open and closed positions (Fig. 3). It can be seen that there was no evidence of erosion of the condyle. This man had been a constant tobacco chewer for over 40 years.

CASE 4—A 61 year old white man had 25 teeth present. He was under treatment for anemia and malnutrition, and although he demonstrated an aversion for food, this did not hold true for chewing tobacco. The teeth of this patient showed the immense concavities which may be ground into the teeth. In Figure 4 the curvature in the lower left first molar can be seen. Here again, no caries was present, and the investing tissues were firm and healthy appearing in contrast to the general appearance of the patient. He thought he had been a tobacco chewer for at least 45 years. There was no history or evidence of temporomandibular joint disorders.

■ *Summary*

Loss of vertical dimension is frequently cited as a contributing factor in the development of the temporomandibular joint syndrome. In a study of 100 patients in whom there was excessive loss of this dimension as a result of the lifelong habit of tobacco chewing, only four patients had any complaints, and these complaints were minor in degree. Two patients had generalized arthritis. It seems reasonable to assume from this study that loss of vertical dimension is rarely a factor in the production of the temporomandibular joint syndrome when cusp interference has been eliminated.

■ CREDIT FOR SCIENTIFIC ACHIEVEMENT

In science the credit goes to the man who is able to convince the world, not to the man to whom the idea first occurred.—*Sir William Osler.*

VOLUME 16 • MAY 1958 • NUMBER 3 CASE REPORTS

Hyperparathyroidism involving the mandible: *report of case*

■ *A. P. Chaudhry,* B.D.S., M.S., Ph.D.; Paul A. Hayes,† D.D.S., and Robert J. Gorlin,* D.D.S., M.S., Minneapolis*

The term "hyperparathyroidism" was introduced by Barr, Bulger and Dixon[1] in 1929 for a pathologic entity also known as von Recklinghausen's disease, generalized osteitis fibrosa and osteitis fibrosa cystica. The clinical description of the disease was first given by von Recklinghausen in 1891 who did not know its etiology. It was not until 1904 that Askanzy[2] suggested a possible association between this disease and enlarged parathyroid glands.

Dawson and Struthers[3] in 1923 reported an instance of generalized osteitis fibrosa with parathyroid adenoma and metastatic calcification. They suggested that a cause and effect relationship may have existed between the adenoma and the bone changes. Furthermore, Mandl[4] discovered that removal of a parathyroid adenoma in a patient with generalized osteitis fibrosa resulted in considerable immediate clinical improvement.

Active extract preparation of parathyroid by Hanson[5] and Collip[6] permitted experimental work which established the fact that the disease is due to hypersecretion of the glands. The increased function of the glands may be due primarily to a benign or malignant neoplasm, idiopathic hypertrophy or hyperplasia of the parathyroid tissue, or to hyperplasia of the parathyroid glands secondary to disturbances of calcium and phosphorus metabolism as is seen in renal failure, rickets or osteomalacia.

Hyperparathyroidism is characterized by hypercalcemia, hypophosphatemia, hypercalcinuria, hyperphosphaturia, and increased alkaline serum phosphatase activity. The primary site of action of the parathyroid hormone, according to Albright and his associates,[7] is the kidney where it causes an increased phosphate excretion. Thompson and Collip,[8] in 1932, could not substantiate this observation in their experimental work. Jaffe[9] in 1933 and Selye[10] in 1942 concluded that the hormone acts directly on the bones, causing their demineraliza-

*Division of oral pathology, School of Dentistry, University of Minnesota.

†Division of oral surgery, School of Dentistry, University of Minnesota.

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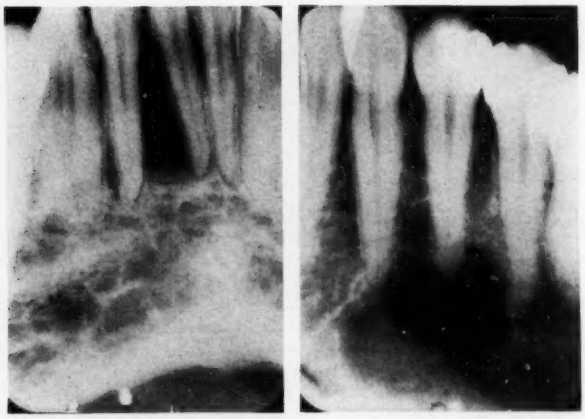

Fig. 1—Left: Destructive lesion of hyperparathryroidism between central and lateral incisors. Right: Another osteolytic lesion extending from cuspid to molar region. Note that trabeculae, though faint and altered in architecture, are still present. Lamina dura of teeth is intact

tion. This results in hypercalcinuria; that is, an increased urinary output.

Black[11] in his monograph on hyperparathyroidism attributed both of these actions to the parathyroid hormone. From his clinical experience, however, he suggested that the phosphate diuretic action is more important than the direct decalcification of bones, since even moderately severe hyperparathyroidism may exist without demonstrable evidence of skeletal disease. Furthermore, if the hormone acts directly on the bones, then hyperparathyroidism without osseous involvement would be difficult to explain since the value for alkaline phosphatase in such instances is normal.

Clinically, the disease occurs three times more often in women, usually after they are 20 years of age, and it reaches its peak in the sixth decade. Hypercalcemia results in diminished neuromuscular activity of both skeletal and smooth muscles, which causes weakness, easy fatigue, hypermobility of joints, abdominal distention and constipation. Nausea and vomiting are common. An increased serum calcium leads to its deposition in the soft tissue organs, especially in blood vessels and urinary tracts.

In the kidney, there may be a formation of renal calculi or a diffuse deposition of calcium in the tubules (nephrocalcinosis). Polyuria is attributed to the primary diuretic action of the hormone as well as to increased excretion of calcium and phosphate through the kidneys. Polydipsia results from excessive loss of body fluids. The fundamental osseous change is due to the demineralization of bones. The demineralized skeleton is painful, tender, and is associated with fibrosis. These areas of fibrosis may undergo cystic degeneration or may show considerable proliferation of the osteoclasts resulting in the formation of an osteoclastoma, also known as giant cell tumor or brown node.

Roentgenographically, the disease presents characteristic skeletal changes especially in the skull, phalanges, and alveolar dental bone. In typical cases, the bones of the skull have granular or miliary decalcification to which the term "ground glass appearance" has been applied. Well-defined osteolytic lesions may also be present. Subperiosteal resorption of bone is reliable roentgenographic evidence of hyperparathyroidism. It is most commonly seen along the margins of the middle phalanges of the fingers. The next most common location is about the teeth where there is a characteristic loss of lamina dura.

Surgical removal of the hyperfunctioning tissue is the only known treatment. The patient is relieved of the acute symptoms and his serum calcium and phosphorus tend to return

11. Black, B. M. Hyperparathyroidism. Springfield, Ill., Charles C Thomas, 1953.

to normal shortly after the operation. The ultimate outcome of the treatment, however, depends on the extent of damage to the renal parenchyma. If damage progresses beyond a certain point, renal insufficiency may be progressive in spite of the cure of hyperparathyroidism.

REPORT OF CASE—A 44 year old white woman was referred to the division of oral surgery, School of Dentistry, University of Minnesota on July 16, 1957, by her dentist whom she had consulted because of pain on the left side of her lower jaw. The roentgenographic examination by the dentist had revealed two osteolytic lesions in her mandible. Her present illness had started in early June 1957, at which time she experienced pain in the left side of the mandible which was also tender on palpation in the lower left bicuspid region. Subsequently, she had developed numbness of the left side of the lower lip. In 1952, she had had an episode of renal colic and hematuria. Pelvic roentgenograms had showed renal calcinosis. She had had another attack of renal colic without hematuria in 1956. The remaining systemic history was noncontributory, except that she complained of having been constipated for the last three months. She denied history of weakness, nausea, vomiting, or urinary disturbances.

Extraoral examination showed no facial asymmetry. Intraorally, there was minimal bulging of the mandible. The oral mucosa was intact and normal in color. The teeth were firm and oral hygiene was fairly satisfactory. There was some tenderness to palpation in the region of the left bicuspids. Routine periapical roentgenograms revealed two radiolucent areas; a small one between the right maxillary central and lateral incisors (Fig. 1, left) and a large one extending from the left mandibular cuspid to the second bicuspid (Fig. 1, right). The latter radiolucency was well-defined, and the trabecular pattern, though faint and altered, was still evident. This lesion did not seem to be associated with the teeth since the lamina dura of the cuspid and the bicuspids was intact. A tentative diagnosis of giant cell tumor was made; however, the possibility of fibrous dys-

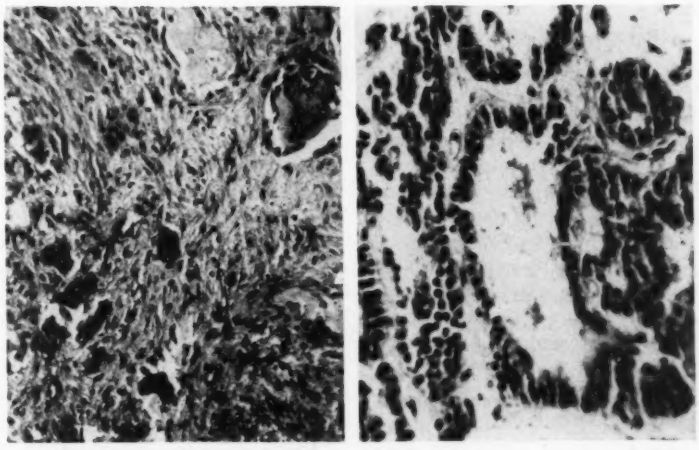

Fig. 2—Left: Photomicrograph of biopsy specimen from mandible. Tissue is composed of spindle cells, collagenous connective tissue and multinucleated giant cells. Note hemosiderosis and formation of bone spicules surrounded by osteoblasts. Right: Parathyroid adenoma. Note dilated acini lined by oxyphilic cells. Acini contain acidophilic secretory material

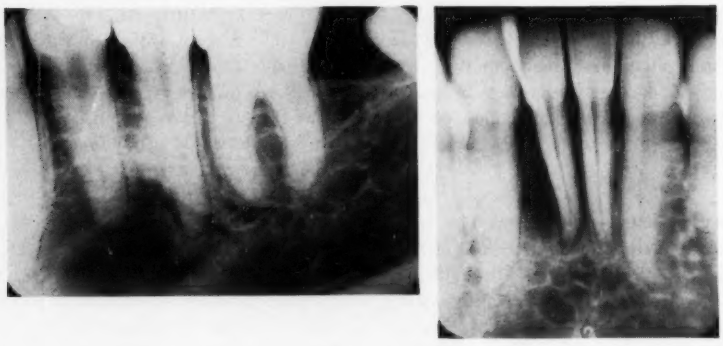

Fig. 3—Two months' postoperatively. Process of healing with formation of new bone in lesions can be seen

plasia, hyperparathyroidism, eosinophilic granuloma, and metastatic carcinoma could not be ruled out.

An intraoral biopsy specimen was taken from the larger lesion and a microscopic diagnosis of central giant cell tumor was made. The specimen was composed of fibroblasts, fibrous connective tissue and multinucleated giant cells. Osteoblastic activity with the formation of bone spicules was also present. Throughout the tissue macrophages laden with hemosiderin were scattered as is shown in Figure 2, left.

It is the policy of the division of oral pathology that patients with central giant cell tumor have blood chemistry studies performed. Accordingly, the patient was referred to the University Hospital for complete physical and laboratory examinations. At the time of admission to the hospital on July 22, 1957, the blood serum calcium was 16.9 mg. per 100 cc., serum phosphorus 1.8 mg. per 100 cc. and the alkaline phosphatase 10 King-Armstrong units per 100 cc. These values strongly favored a diagnosis of hyperparathyroidism.

Routine chest roentgenograms were negative for active tuberculosis. The pelvic roentgenograms showed diffused calcific deposits throughout the renal parenchyma. Present calcifications were also noted in the bladder. They were diagnosed as probably phleboliths. There was no convincing evidence of hyperparathyroid changes in other bones. Because of the presence of hypercalcemia and hypophosphatemia, it was considered desirable to explore the neck region for examination of the parathyroid glands. On August 2, under general anesthesia, the neck region was explored and several nodules were found in the inferior poles of the thyroid gland.

Another nodule was present in the middle on the posterior surface of the gland. This nodule, on frozen section examination, was found to be adenoma of parathyroid tissue. The tumor was composed of small acidophilic cells with scant cytoplasm and relatively large round nuclei. These cells were arranged in cords or acinar structures and were tightly packed with minimal intervening stroma or fat. The acini were filled, at places, with pink amorphous secretory material. The tumor nodule was surrounded by loose fibrous connective tissue but did not have a distinct capsule (Fig. 2, right).

The patient did very well postoperatively and was discharged from the hospital on August 5, at which time serum calcium and serum phosphorus were 10 mg. per 100 cc. and 3.6 mg. per 100 cc., respectively. She was last seen on October 29, 1957. The intraoral roentgenograms showed evidence of deposition of new bone in the radiolucent lesions (Fig. 3), at which time the blood chemistry was still within normal range.

DISCUSSION—This case report brings up several points of interest for discussion. It illustrates alertness and vigilance on the part of the referring dentist who sent the patient to the division of oral surgery for diagnostic purposes. It also stresses the contribution that the dental profession can provide in diagnosing systemic diseases which may also have manifestations in the oral cavity or its related structures. Furthermore, it emphasizes the need for a detailed medical history.

Although the most common symptoms of hyperparathyroidism such as weakness, fatigue, nausea, vomiting, polyuria and polydipsia were lacking, such information as the age and sex of the patient, past history of constipation, and renal calcinosis favored the consideration of this disease in differential diagnosis. Since the roentgenographic examination was not sufficiently diagnostic, other possibilities such as fibrous dysplasia, eosinophilic granuloma, central giant cell tumor, and metastatic carcinoma could not be ruled out.

As these possibilities were also in mind, it was thought best to obtain a biopsy specimen of the lesion rather than try to eradicate it completely. The soundness of routine blood chemistry studies on the patients with diagnosis of central giant cell tumor was not only gratifying but also rewarding. Hypercalcemia and hypophosphatemia left no doubt concerning the true nature of the disease, which was further confirmed on finding adenoma of the parathyroid gland.

SUMMARY—A 44 year old woman developed two osteolytic lesions in the mandible because of adenoma of the parathyroid gland. This case report emphasizes the importance of a detailed medical history and blood chemistry studies on patients with central giant cell tumor.

Surgical ciliated cysts of the maxilla: *report of cases*

■ *G. Thaddeus Gregory,* D.D.S., and William G. Shafer,† D.D.S., M.S., Indianapolis*

The purpose of this paper is to report the occurrence in several patients of a type of lesion which apparently has not been recorded previously in the literature. The particular lesion to be reported is a type of cyst arising in the maxilla. In each patient the cyst developed after previous surgical entry into the maxillary sinus during a Caldwell-Luc operation. Histologically, the cyst appears to be derived from the epithelial lining of the maxillary sinus which apparently has been trapped in the wound during closure of the incision and subsequently begins to proliferate. Clinically, the patient usually complains of a nonspecific, poorly localized pain or discomfort in the maxilla. Subsequent roentgenographic examination reveals a well-defined radiolucent area closely related to the maxillary sinus. Occasionally, this cystlike area appears to encroach on the sinus itself. Lack of communication between the antrum and the cystic defect can be demonstrated by injecting the sinus with radiopaque material whereupon a filling defect of the cystlike area can be noted (Fig. 1,2).

*Professor of oral surgery, Indiana University School of Dentistry.

†Assistant professor of oral pathology, Indiana University School of Dentistry.

That these cystic areas are derived from the mucosa of the maxillary sinus is suggested by the fact that the epithelium lining the cyst is of a pseudostratified ciliated columnar type (Fig. 3) or, occasionally, a transitional type, particularly if the area is infected. This suggests derivation from the antral lining. The four patients discussed in this article all gave a history of having undergone a Caldwell-Luc operation from 10 to 20 years previously.

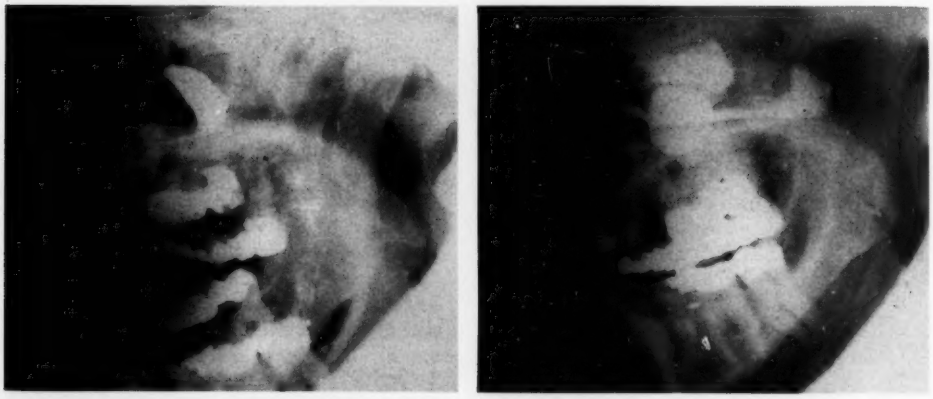

Fig. 1—Left: Maxillary antrum injected with Lipiodol. Filling defect can be noted. Right: Instance in which cyst also is injected

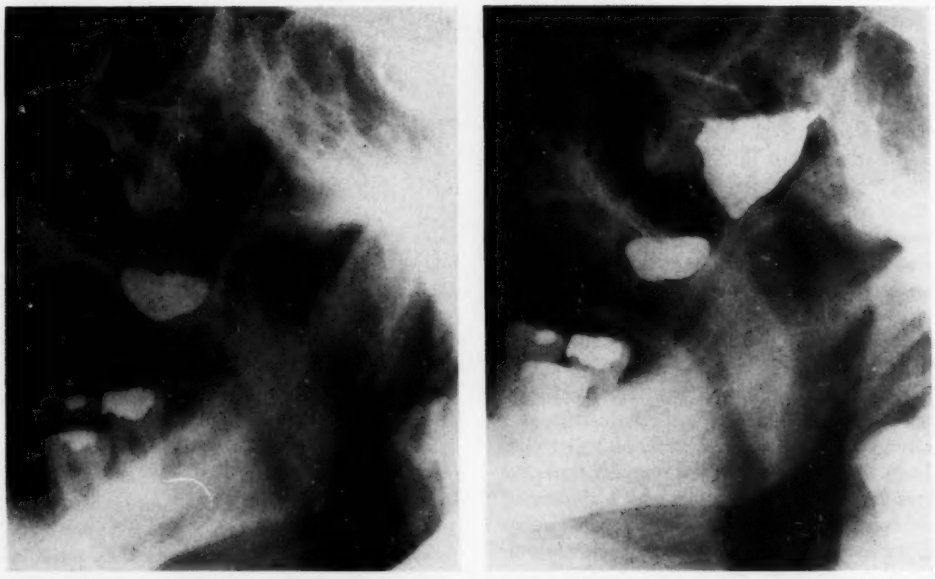

Fig. 2—Left: Cyst has been injected. Right: Antrum has been injected

CASE 1—A 45 year old edentulous man complained of pain and swelling of the right maxillary region which had begun three months previously. A history of a Caldwell-Luc operation, performed approximately 17 years prior to the onset of the present symptoms, was given. Roentgenographic examination revealed a cyst in the right maxilla which, by Lipiodol injection, was shown to have no connection with the maxillary sinus. The lesion was excised, and subsequent histologic examination of the tissue removed revealed a cyst lined with a pseudostratified ciliated columnar epithelium.

CASE 2—A 45 year old man had a similar clinical history which included a Caldwell-Luc operation 18 to 20 years previously. Roentgenographic examination revealed a similar type of cyst which, on histologic examination, was found to be lined by a pseudostratified columnar epithelium.

CASE 3—A 50 year old woman gave a clinical history and had symptoms similar to those described in Cases 1 and 2. A Caldwell-Luc operation had been performed between 12 and 17 years previously. The patient was uncertain of the exact date. Histologic examination after excision of the cyst revealed a thick wall of granulation tissue with chronic inflammation. The cyst was lined with epithelium of stratified squamous, transitional and pseudostratified columnar varieties.

CASE 4—A 52 year old man had a chief complaint of vague pain and discomfort in the maxilla. He stated a Caldwell-Luc operation had been performed 15 years previously. Roentgenographic examination revealed a cystlike area which was not associated with the maxillary sinus, as demonstrated by Lipiodol injection. Histologically, the cyst was found to be lined by pseudostratified ciliated columnar epithelium.

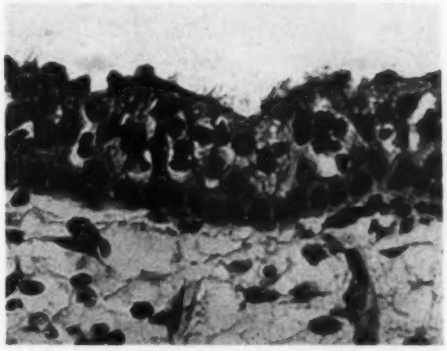

Fig. 3—Wall of typical cyst showing pseudostratified columnar epithelium with occasional cilia

COMMENT—It has been found that Lipiodol injected into the maxillary sinus is a valuable aid in differential diagnosis. It should be employed in all instances of obscure neuralgic pain in patients who have had a Caldwell-Luc operation in years past so as to rule out the possibility of cyst formation in the healed incision.

■ ABILITY

A genius can be designated as a person who can do almost anything except make a living. One may add that natural ability without education has oftener raised man to glory and virtue than education without natural ability.—*Marcus Tullius Cicero. Oratio Pro Licinio Archia.*

Tooth in the maxillary sinus: *report of case*

■ *Arthur D. Eastman, D.D.S., U. S. Navy*

Reports of teeth in the maxillary sinus carried there by such factors as freak development, trauma, accidents, cystic odontomas have been reported in the literature.[1-3] This case is reported because it has features believed to be rare.

The patient was a well-developed white seaman, age 21. He complained that sometimes when he took a drink of liquid such as water, Coca Cola or coffee a few drops would run out of his right nostril.

PAST HISTORY—At the time of his enlistment in March 1951, the four third molars and the lower right first molar were missing and he had five fillings. There were five occlusal cavities, including one in the upper right second molar. This was repaired in April with a cement base and amalgam. This tooth became tender and felt loose in June. By July he could express foul-smelling pus with finger pressure "against the gum between the roots." Sometimes eating would cause it to discharge. It was "extremely foul tasting."

The tooth was extracted, the socket curetted and a drain inserted on July 18. The drain was changed and the socket irrigated daily for about a week. The patient then was given a syringe and instructed to flush the socket with warm saline solution after meals. Healing was uneventful and complete except for a small depression in the alveolar region.

Early in March 1952 he first noticed that when he took fluids by mouth a few drops occasionally were discharged from the right nostril. He came to the dispensary March 11, at which time I assumed his care. There was no history of any childhood injury to the head or face and no knowledge of any tooth abnormalities in his family.

EXAMINATION—High on the buccal mucosa in the region of the upper right second molar was a small round opening 0.5 mm. in diameter which communicated with the right maxillary sinus. All other mucosa was normal, the mouth hygiene was excellent and the occlusion was good.

Roentgenographic studies (Fig. 1) revealed a fully developed molar tooth high up in the sinus. Close study of Figure 1 revealed a picture that would be common to many impacted mandibular third molars; namely, a slight thickening of the periodontal membrane and a definite, well-defined cystic area enveloping the crown. Additional roentgenograms taken after the injection of Lipiodol into the orifice in the upper right second molar region showed free passage of this substance into the maxillary sinus, up around the tooth, through the sinus and down the nose and throat (Fig. 2). Although this eliminated the possibility of a diagnosis of cystic odontoma, it was felt that this tooth should be removed before closure of the oroantral fistula was attempted.

Accordingly, the patient was admitted, and routine laboratory tests were completed.

OPERATION—On April 1 the patient was given ¼ grain (15 mg.) of morphine sulphate

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Captain, Dental Corps, U. S. Navy. Headquarters and Service Battalion, Fleet Marine Force Pacific, F.P.O. San Francisco.

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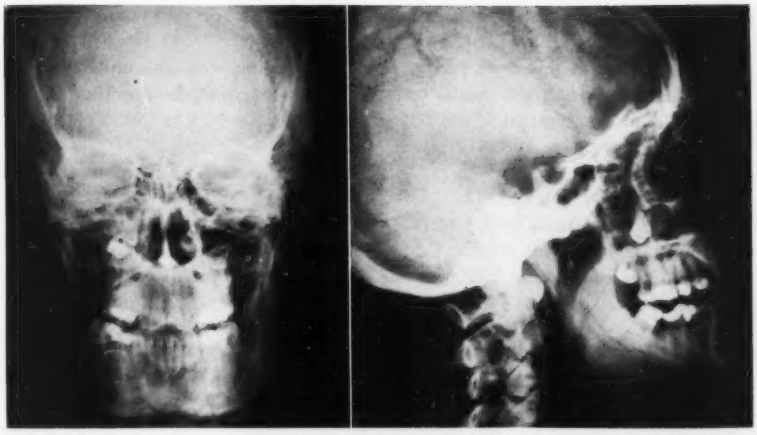

Fig. 1—Left: Posteroanterior view. Right: Lateral view

Fig. 2—View showing passage of Lipiodol

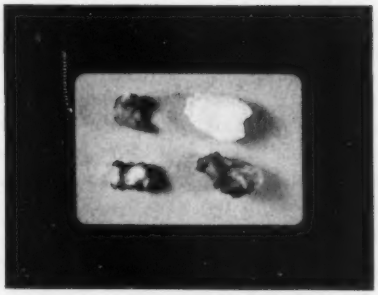

Fig. 3—Specimen removed from maxillary sinus

and 1/150 grain (0.4 mg.) of atropine. With the patient under block anesthesia of the second division of the fifth cranial nerve administered through the posterior palatine and infraorbital foramens, an incision was made in the mucobuccal fold from the upper right lateral incisor back to the distal aspect of the upper first molar. A mucoperiosteal flap was raised to a point well above the roots of the teeth, exposing the canine fossa and the maxillary process of the malar bone. A window 1.5 by 2 cm. was cut into the sinus.

From a clinical standpoint the sinus appeared normal, that is, no fluid or cyst was pres-

ent and the color and texture of the lining membrane appeared normal. However, hanging from the highest point of this bone cavity, centered, and about 1 cm. from the mesial or nasal wall, was a smooth bone pillar like a stalactite. It was about the size and shape of a fully developed upper third molar with fused roots. The occlusal portion was perhaps 1.5 cm. above the antrum floor. At its bony attachment over the apex region there was a fine suture line between the two bones. The bone containing the tooth was dissected free along this line and removed.

A 10 per cent solution of cocaine was applied on a cotton swab to the lateral wall of the inferior meatus, through the right nostril. A window was punched through into the sinus. A strip of ½ inch autoclaved petroleum jelly gauze was introduced through the sinus, out the nose and taped to the upper lip. The sinus cavity was then packed completely but lightly with gauze, fold on fold, and the buccal flap was closed tightly.

Forty-eight hours postoperatively, about 18 inches of the petroleum jelly gauze was drawn from the nose. Each day thereafter a like amount was withdrawn until on the sixth day none remained. At this time the sutures were removed.

On the tenth postoperative day, a small mucoperiosteal flap was raised in the region of the upper right second molar so that the flap contained the oroantral fistula near its edge. The tract was cut away and the flap reapproximated. The sutures placed were removed in four days.

Healing was uneventful and satisfactory for both stages of the operation.

GROSS EXAMINATION OF SPECIMEN—The bone which encased the entire tooth was about as thick and uniform as parchment paper (Fig. 3). The ends of the pulps of two of the roots protruded beyond the apex about 1.5 mm. and were obviously vital. The well-defined "cystic" area noted around the crown in Figure 1 proved to be a complete tooth follicle, pink and healthy in appearance. It was well defined on the roentgenogram because it was tightly encased in very thin bone.

SUMMARY AND CONCLUSION—This case is reported for its rarity and unusual aspects. Much of the early history was obtained from the patient's naval dental record. At one point during the examination strong consideration was given to the theory that the upper right second molar might have just happened to be in the path of drainage from an infected dentigerous cyst. Further investigations proved that its pulp was devitalized either as a result of a deep restoration or, still more likely, from traumatic occlusion as a result of the absence of a lower right first molar which allowed the second to incline mesially. It is not known why a normal, vital tooth was found in this location, not remotely connected to, or driven from, the alveolar process of the maxilla.

■ CONFLICT IN WORLD TODAY

The conflict is not between disciplines, between humanism and science. The conflict lies between man and the world he has made for himself.—*Prince Philip, Duke of Edinburgh.*

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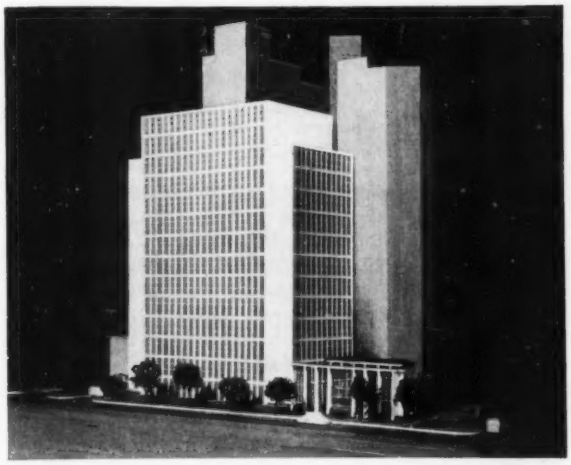

The move to Chicago

THE RECENT ANNOUNCEMENT that rental space has been made available in the new American Hospital Association building on Lake Shore Drive in Chicago for the central office of the American Society of Oral Surgeons should be greeted in all quarters as a welcome step forward in our relations with that important health organization. The location is an excellent one since it is in the area in which the majority of the other medical and dental organizations are located in Chicago. The mechanical facilities available in this beautiful new building and the opportunity for steady improvement in and mutual understanding of common problems by daily contact between the staff of the American Hospital Association and the executive staff of the American Society of Oral Surgeons are obvious advantages over any other possible location.

It is indeed fortunate that the construction of this new building coincides with the decision of the American Society of Oral Surgeons to relocate its central headquarters in the Chicago area, and it is even more fortunate that the American Hospital Association has rental space available and welcomes us as tenants. Since completion of the building is scheduled for January 1959, there is ample time to select new personnel and to make a gradual transition from the present office in Louisville with the help of the present part-time secretary, A. B. Coxwell, who has graciously agreed to assist the new secretary to become adjusted to his position. Because of all of these fortunate circumstances, the American Society of Oral Surgeons now promises to develop to its full potential in its relations with medicine, in service to its members, and in stimulation of education and research in oral surgery, thereby fulfilling its obligations to dentistry and to the public.—*Fred A. Henny.*

Dental societies and radiation hygiene

The immense amount of information—and misinformation—which has appeared recently in the daily press and popular magazines regarding the genetic dangers of x-rays, including dental x-rays, has caused a number of dental societies to investigate the situation within their communities. Recently three local dental societies, widely separated from each other, report efforts to reduce radiation exposure from dental x-ray machines. The Council on Dental Research of the American Dental Association is indebted to John H. Huschart for his report of the study being made in Cincinnati, Ohio, to Leonard F. Menczer for his account of the Hartford, Conn., x-radiation program, and to Robert J. Nelsen for the Southern Maryland Dental Society program account.

■ *Cincinnati, Ohio, Study*

The Cincinnati Dental Society is planning a city-wide study of dental x-ray machines and an installation of lead diaphragms and aluminum filters on all machines where indicated. This program is being carried out in close cooperation with the Advisory Committee on Radiation of the Cincinnati Board of Health, the Mayor's Radiation Legislation Advisory Committee, and the Kettering Laboratory. It is being conducted under the special guidance of Dr. Mitchell R. Zavon of the Occupational Health Section of the Cincinnati Health Department. The major Cincinnati dental dealers have pledged their cooperative assistance. Preliminary plans call for the issuance of film badges as a method of demonstrating the benefits of the program.

Cincinnati is believed to be one of the first cities to develop its own radiation exposure control committees, and the Cincinnati Dental Society is believed to be among the first component dental societies to inaugurate a program for the purpose of improving the safety and effectiveness of roentgenology.

■ *Hartford, Conn., Study*

Because of the desirability of reducing radiation exposure from the dental x-ray machine, the Hartford Health Department undertook what it termed, "Operation: dental x-ray filtration"—a project whereby every dentist of the Greater Hartford area was offered the necessary aluminum disk and lead diaphragm, free of charge, for his x-ray unit or units.

The many manufacturers of dental x-ray equipment provide today a circular disk of aluminum of varying thickness which fits either into the pointer cone or the head of the x-ray machine itself. This aluminum disk will filter out approximately 50 per cent of the short, soft rays that are least effective in roentgenography and most harmful to the soft tissues of the body. The lead diaphragm, inserted in a similar way, narrows the diameter of radiation exposure of the patient's face so that where an area of about five to six inches in diameter was exposed, this would be reduced to an area three inches in diameter; and, of course, with the use of ultra-fast film, the total exposure can be reduced even further.

With a minimum of effort on the part of the dentist and an expenditure of what can be counted in pennies, the average patient seeking dental care need not be exposed to more than, perhaps, 20 to 30 per cent of the radiation he is presently receiving when these precautions are not taken.

When this offer was made to the dentists of Greater Hartford—approximately 300 of them—replies were received from approximately two thirds within a three week period and in subsequent weeks as many as three fourths of the total dentist population made requests for

these adjuncts for their x-ray units. It is recommended that every community, either through its local health department or dental society, undertake a similar project in order to insure a maximum of radiological safety to dental patients.

■ *Southern Maryland Dental Society Program*

Believing that the best way to get anything done is to "Do It Yourself," the Southern Maryland Dental Society has distributed an instruction folder on x-ray protection to each of its members. The folder contains aluminum filters and complete directions for the dentist to modify his own x-ray machine so that it will have the proper amount of filter and will meet other requirements of modern dental roentgenography.

The pamphlet contains four 0.5 mm. disks of pure aluminum which the dentist can place as additional filter in his x-ray machine if necessary.

Other suggestions relating to good roentgenographic practice are included along with a listing of recent articles appearing in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION which are concerned with the subject of x-ray protection.

The pamphlet was designed by Robert J. Nelsen of Rockville, Md. He is the official representative of the American Dental Association to the National Committee on Radiation Protection.

■ Suture Technics

Q.—What determines the choice of interrupted, continuous locked, and mattress sutures in the surface approximation of mucoperiosteal flap closures after ridge preparation and similar procedures?

A.—Technics of suturing vary with the personal preference of the operator, but a few general principles may be cited. All primary sutures should be placed over areas of bone support. If the ridge is regular in height and the soft tissues are adequate in quantity, the continuous locked suturing technic is rapid and efficient. When, on the other hand, irregular contour has been produced by previous alveolar atrophy or pathologic condition, interrupted sutures placed first over zones of prominent bone will offer better distribution of the flap margins. Mattress sutures for oral mucosal closure are most helpful where the tissues of flap margins are thin and it is desirable to engage more tissue to prevent tearing of the margins by the suturing.

■ Roentgenographic Examination for Maxillofacial Injuries

Q.—Will you please list the roentgenographic views I should order from a hospital radiology service to explore for fractures of the facial bones?

A.—The use of roentgenograms in the diagnosis of fractures of facial bones is, of course, to supplement your clinical or bedside observations. In any given instance several of the following views may be deleted depending on the physical findings. For definitive roentgenographic examinations all the following technics should be considered, in the stereoscopic projections if available: (1) posteroanterior view of skull, (2) lateral view of skull to include mandible, (3) inferosuperior basal view of skull, (4) verticomental Waters' views (paranasal sinuses), (5) posteroanterior view of mandible, (6) left and right lateral views of mandibular rami and (7) left and right lateral views of the body of the mandible.

Other injuries may preclude positioning the patient for the various projections, and, then, compromises must be made by obtaining anteroposterior views rather than posteroanterior views. For example, other special roentgenographic examinations should be borne in mind including a view of the temporomandibular articulation, a verticofrontal projection of nasal sinuses, a projection with Titterington's position for facial bones, and the verticosubmental projection for facial bones. The oral surgeon should understand the technics of positioning the patient for maxillofacial roentgenographic views well, as these views constitute but a small part of the work of a general roentgenographic service, and if, for instance, a bedside portable x-ray machine is needed, the oral surgeon may have to direct the positioning of the patient and film.

It is good to suggest or request examination of the cervical spine in all instances of head injuries, if an attending neurosurgeon, general surgeon, or orthopedic surgeon has not done so. The detailed examination possible with dental x-ray units should not be neglected if such equipment is available. A chest film is important to both routine evaluation and to rule out the possibility of the aspiration of avulsed teeth and foreign bodies.

This section devoted to queries and comments from readers on topics of current interest to oral surgeons and general dental practitioners is edited by S. Elmer Bear, Department of Oral Surgery, Medical College of Virginia, Richmond, Va., to whom readers are invited to send their communications. The answers, prepared by competent consultants, do not necessarily represent the opinions of any official scientific organization. Your participation in this section is invited.

The Editor.

■ Management of Pericoronal Flaps

Q.—What advice can you give about the management of pericoronal flaps over the distal aspect of partially erupted third molars?

A.—The management of third molar flaps must depend on the state of eruption and the potential behavior of the tooth in the future. The patient's age, roentgenograms and clinical examination will give some indication as to the eventual position of the third molar if its eruption continues. If normal positioning of the third molar when eruption is complete can be anticipated, then the conservative approach should be used; the flap should be excised. If, however, there is evidence of mesial inclination of the tooth against the second molar or if the distal portion of the crown lies slightly under the anterior border of the ramus, then normal eruption generally cannot be expected and the removal of the tooth is indicated. All too often pericoronal flaps are excised from around the distal aspect of the tooth only to recur as sufficient room for normal eruption is not available. The tooth remains in a relatively dormant position of partial eruption which encourages regeneration of the excised tissue. This condition becomes troublesome and is potentially a source of severe infection if the tooth is not removed.

■ Necrotizing Ulcerative Gingivitis

Q.—In acute necrotizing ulcerative gingivitis (Vincent's infection) is there any preferred mode of treatment and of what value are the antibiotics in effecting a cure?

A.—For many years, drugs of various types have been used in the treatment of acute necrotizing ulcerative gingivitis and failures in therapy were not uncommon. Since it is felt that bacteria are a contributing rather than a causative factor in periodontal disease, any treatment plan directed at the reduction of the bacterial count only will prove unsuccessful. Although the bacterial phase of necrotizing periodontal disease should not be overlooked, it must be remembered that organisms found in an acute necrotizing ulcerative gingivitis are the same organisms as are found in healthy mouths. The difference is a quantitative rather than a qualitative one. Put more simply, it is felt that the organisms are secondary to all other causative factors.

Unless there is some contraindication, antibiotics can and should be employed in controlling the acute phase of this disease. The indiscriminate use of such medications is to be condemned because of increased sensitivity to the antibiotics by countless numbers of the population. The administration of these drugs should not be considered as routine therapy for acute necrotizing ulcerative gingivitis. It should be reserved for those patients suffering from general malaise, increased temperature, lymphadenopathy associated with the oral condition, or for the patient with a history of rheumatic fever. Drug administration, at best, only forces the acute stage of the disease into one of chronicity which is characterized by little discomfort.

In the acute phase 600,000 units of penicillin, administered either parenterally or orally, will be most helpful when given daily until the acute phase subsides. Topical antibiotics are not indicated under any circumstances since the parenteral use is far more effective and much less prone to produce host sensitivity to the drug or bacterial resistance.

Over-all periodontal therapy to remove the causes and effects of the disease and restoration of the parts to physiologic form and function must accompany this drug administration.

■ SULFONAMIDE UND ANTIBIOTIKA IN DER ZAHN-, MUND- UND KIEFERHEILKUNDE (SULFONAMIDES AND ANTIBIOTICS IN DENTISTRY). By Prof. Herbert Harnish. Second edition. 110 pages with 41 illustrations. Bibliography. Index. DM. 12.60. Munich, Carl Hanser Verlag, 1956.

The author is a famous German dental scientist who has had wide clinical experience with antibiotic and chemotherapeutic drugs used in dental practice. This paperbound booklet is issue number five of the series *Monographs on Dental Subjects*, edited by Prof. H. H. Rebel and P. Jaeger.

The book is divided into three short parts as follows: (1) history of chemotherapy and description of manner of action, pharmacologic properties, dosage, methods of application of sulfonamides, antibiotics and antibiotic-vitamin mixtures, and penicillin and allergy tests; (2) oral conditions and operative procedures in which sulfonamide or antibiotic treatment is used, and (3) combined treatments, laboratory aspects, complications encountered during and after antimicrobial treatments in dental practice and comments concerning the management of these complications.

This book should prove useful to the dental practitioner and student who is able to read German. It is neither a textbook nor a reference work and contains little data which would interest a researcher.

The references listed are selected on the basis of their importance or historical interest. However, many foreign authors who have contributed much to research and development of antibiotics are omitted.

Scattered throughout this book are quotations from eminent, mainly German, scientists. These "pearls of wisdom" are pleasing but they do not add greatly to the usefulness of the work.

This book contains a valuable appendix which lists the chemotherapeutic agents together with their German trade names and indications for their use. In meeting the need for such information, this unpretentious monograph can do much good.—*Paul H. Glucksman.*

■ A FRONTAL SECTION ANATOMY OF THE HEAD AND NECK. By O. F. Kampmeier, A. R. Cooper and T. S. Jones. Illustrated. $15. Urbana, Ill., University of Illinois Press, 1957.

This atlas is a unique and beautiful book. It pictures in great detail 20 frontal sections of head and neck, taken serially in distances of one half inch. The figures in actual size are preceded by five key figures orienting the reader as to skeletal landmarks, soft tissues in a midsagittal plane, arteries and veins. The sectional figures themselves are exhaustively labeled, to allow proper identification of all structures. Here and there small errors have crept in: Chiasma optica instead of opticum on Section 8; in the same plate, cerebri int. instead of anterior, and the processus clinoideus is left uncolored. In the plates following these the Galea aponeurotica is not well defined and the line reaches to the periosteum; where one line indicates two structures the peripheral dot is sometimes hard to see.

One can only agree with the authors that such an atlas was most desirable. Here is a book that delineates the third dimension so sorely, though inevitably, lacking in the illustrations of the standard textbooks. One can hope that teachers in anatomy will make good use of a splendid work.—*Harry Sicher.*

■ THE VIABILITY OF PRESERVED BONE. S. L. Haas, M.D. Surg., Gynec. & Obst. 105:449 Oct. 1957.

Establishment of bone banks has stimulated investigations concerning methods of preservation, optimum temperature, media, and length of time bone may be kept to obtain successful clinical results. Questions have again arisen as to whether a bone graft functions to contribute actively in either temporary or permanent osteogenesis in itself; stimulates by some unknown factor surrounding or invading mesoblastic tissues or adjoining bone, or is merely an inert framework for new bone. The investigations of various other workers regarding the fate of transplanted bone are reviewed. Supravital staining technic has been used to demonstrate the viability of bone cells stored in human plasma for as long as 28 months.

This study sought to evaluate the methods of bone preservation in different media and at variable temperature and different periods of time. Bone was kept for varying periods in homologous serum at 5° C. and −30° C. in autogenous serum at 5° C. and −30° C. and in homologous citrated whole blood at 5° C. and −30° C., by the method of quick freeze preservation. Two tests were run using whole citrated homologous and autogenous blood, with the bone fragments kept at 5° C. and −30° C. and then replanted in the back muscles of the animal from which they were removed.

Results of these experiments are summarized. Regardless of the medium, viability of bone kept at −30° C. was uniformly lessened, and that kept by quick freeze was lacking in the inherent osteogenic properties of live bone. Bone preserved at 5° C. in serum showed only slight osteogenic activity, whereas with the whole citrated blood experiments, the bone preserved in homologous blood showed greater osteogenic response.

It was concluded from these experiments that fresh autogenous bone grafts offer the greatest chance of success. Citrated whole blood allows the longest survival period of osteogenic cells and greatest osteoblastic activity, with homologous blood superior to autogenous blood. The optimum temperature for preservation of osteoblastic activity was about 5° C. Serum did not serve as a good preservation medium for bone.—*William J. Amaral.*

■ EXTRAORAL PINNING OF DISPLACED CONDYLAR FRACTURES. N. Georgiade, M.D., D.D.S.; K. Pickrell, M.D.; W. Douglas, M.D., and F. Altany, M.D. Plast. & Reconstr. Surg. 18:377 Nov. 1956.

The majority of condylar fractures can be treated conservatively. This method of treating condylar fractures is consistent with good surgical principles. Reports of complications after conservative treatment of displaced condylar fractures vary greatly. Some doctors report that only 5 per cent of their patients suffered complications whereas others report that nearly all of their patients suffered some disturbance of the temporomandibular joint.

The indications for extraoral pinning include condyles displaced from the glenoid fossa with overriding of the mandibular fragments.

Intraoral devices are applied preoperatively for intermaxillary fixation. An inverted hockey stick incision is made. The parotid gland is retracted anteriorly. A nerve stimulator is used to outline the branches of the facial nerve. If the joint capsule is intact, no attempt is made to open into it. If it is opened, the meniscus is examined for lacerations and, if damaged, a meniscectomy is performed. The fragments are positioned, and a steel pin is placed in the condylar fragment. Other pins are placed in the zygomatic arch or the mandibular fragment, or both, depending on the indications. The pins are immobilized by means of a crossbar and tightening nuts. The operative site then is closed in layers.—*Gilbert S. Small.*

■ A FURTHER INVESTIGATION OF THE SURGICAL APPLICATION OF TITANIUM METAL IN DOGS. O. E. Beder, D.D.S.; J. K. Stevenson, M.D., and T. W. Jones, M.D. Surgery 41:1012 June 1957.

Previous investigations have shown that titanium metal is inert in the body of a dog. A further investigation was performed to demonstrate the effects of different physical forms of the metal; namely, fracture plate, nuts, bolts, screws, pins and skull plates on the dog.

The various forms of the metal were inserted into fracture sites of long bones and the skulls of dogs. These were left in position for periods from 120 to 180 days. It was noticed that there were no objective findings of infection or inflammation. At the end of the period, roentgenograms were taken and it was noticed that normal repair had taken place with no apparent osteolytic activity. It was also noticed that the titanium sheet in the skull was radiolucent.

Titanium has the advantage over stainless steel and tantalum because of its tolerance by tissues and its relatively low cost. It is also lighter than these other metals and yet has equal tensile strength.—*Gilbert S. Small.*

■ IMPORTANT CONSIDERATIONS IN MAXILLOFACIAL INJURIES. James J. Ivory, D.D.S. Am. J. Surg. 93:335 March 1957.

The high speed of present day travel is responsible for the ever increasing number of severe, crushing injuries to the face and jaws. The importance of a thorough examination in all cases of traumatic injuries to the face is emphasized. Emergency treatment of maxillofacial injuries is discussed and this includes treatment for shock, intracranial complications, control of hemorrhage and the establishment of an unobstructed airway, and the relief of pain.

Consideration should be given for débridement of facial wounds before immobilization of fractures is attempted. Patients should be screened carefully for sensitivity to antibiotics. The presurgical history is important in order to learn, if possible, whether the patient is diabetic, or whether or not he has received steroid therapy. Definitive therapy is discussed for the various maxillofacial fractures.

Fractures of the face may not always be accompanied by conspicuous deformity, and therefore early recognition and treatment is of paramount importance. Malunion, nonunion, ankylosis, loss of function and many other serious complications may be caused by faulty diagnosis and delayed treatment. Close cooperation between the oral and general surgeon in treating patients with injuries to the face and jaws is indispensable.—*Irwin A. Small.*

■ THE MANAGEMENT OF VISIBLE HEMANGIOMAS. Harry M. Blackfield, M.D.; Frances A. Torrey, M.D.; William J. Morris, M.D., and Bertram V. A. Low-Beer, M.D. Am. J. Surg. 94:313 Aug. 1957.

In 1949 the department of dermatology, radiology and surgery at the University of California Medical Center in San Francisco instituted a group project to study the visible hemangioma problem. Spontaneous involution of the most common hemangiomas of infancy and childhood must be accepted as a fact. However, in some instances involution progresses slowly, and in a small percentage regression does not occur.

When surgery is forced by parental pressure and is attempted during the growing phase of the large involuting type of hemangioma, complete excision is rare and growth will continue in the residual vascular tissue until the latent period is reached. If operation is delayed until involution has started, then a more conservative excision can be performed, as the residual vascular tissue will involve spontaneously.

If early therapy is required to placate the parents, some homeopathic method of treatment at infrequent intervals should be carried out. It is also recognized that in the preschool period plastic surgery is necessary to remove the residual cosmetic disfigurements of the large hemangioma. However, surgery which is per-

formed a number of years after the involution of large hemangiomas is much simpler and less dangerous than when attempted in infancy. Furthermore, it is felt that radical methods of treatment which damage or prevent the growth of normal tissues are contraindicated. A discussion of the treatment for noninvoluting types of hemangiomas is presented. As a result of their study of over 700 patients, a complete practical classification of hemangiomas is presented.—*Myron Kaufman.*

■ Recent Advances in Therapy in Maxillofacial Bony Injuries in Over 1,000 Cases. Richard H. Walder, M.D., D.D.S., and Bertram E. Bromberg, M.D., D.D.S. Am. J. Surg. 93:508 April 1957.

This study is based on a five year period and discusses the treatment and statistical survey of 1,305 patients. Of these, 544 had nasal fractures, 633 had zygomatic arch fractures, 46 had fractures of the malar compound, 22 had fractured maxillas, 495 had fractured mandibles and 135 had multiple fractures. Injury as a result of blows to the face was the etiologic factor in 608 instances. Falls accounted for 276, and automobile accidents accounted for 404 instances. Closed reductions of nasal fractures were carried out in 450 instances. There was no treatment in 94. In fractures of the facial bone, closed reduction was done in 456 instances, and open reduction in 361. There was no treatment in 37.

The diagnosis, treatment, and complications of a wide variety of maxillofacial fractures are discussed and a variety of treatments for each of the fractured bones is described. The foremost significant observation derived from this study is the necessity of early reduction and immobilization of maxillofacial fractures. This will give the patient the best opportunity for suitable cosmetic restoration, with minimal functional loss. Complications are kept to a minimum, and infection and rhinorrhea is prevented by early treatment. The frequent use of tracheostomy to overcome an obstructed airway must be considered constantly. The full significance and value of a direct bone-wiring technic is firmly established. It is important to adhere to the principle of utilizing the nearest solid bony structure lying cephalad to the fracture site for support.—*Irwin A. Small.*

■ Patient Exposure to Ionizing Radiation in Dental Radiography. Norman H. Baily, Ph.D. Radiology 69:42 July 1957.

Two important requirements become apparent with the increasing use of ionizing radiations and exposure of the individual as larger segments of the population are being exposed. First, exposures to various radiations must be evaluated accurately; and secondly, all possible means must be taken to reduce exposures in necessary medical and dental procedures. Reduction of patient exposure in dental roentgenography is possible by use of faster films, increased focal skin distance, and more penetrating radiation. The use of filtration has been shown to result in a roentgen beam with greater penetration and reduced ratio of skin to bone dosage. Raising the operating potential from the usual 60 or 65 kilovolt peak to the range of 85 to 100 kilovolt peak further improves the quality of the beam.

The purpose of this investigation was to determine the dose delivered to the apical regions during dental roentgenography under the usual operating conditions with and without addition of a 1.0 mm. aluminum filter, and an 8 inch focal skin distance. The total dose administered in the course of a full-mouth examination to these sites—left and right thyroid lobes, anterior, center, and posterior maxillary regions; anterior, center and posterior mandibular regions—was computed on the basis of a listed set of exposure times. The skin dose administered under various operating conditions was shown to be reduced by 1 mm. aluminum filtration to approximately 55 per cent of that without a filter. Also lessened was the dose absorbed by bone, results varying according to the part considered, to as much as 38 per cent reduction. When a filter was used, increasing the operating potential from 60 to 65 kilovolt peaks did not affect the quality of the radiation for practical purposes. Lead shielding of 0.5 to 2.0 mm. over the thyroid regions was found

to result in no appreciable reduction of the dosage to the thyroid gland.

Dose to the bony structure per full-mouth set of films ranged from 8 to 23 r for adults and from 3 to 9 r for children, depending on operating voltage and added filtration.—*William J. Amaral.*

■ STUDIES ON SIGNIFICANCE OF BIOLOGIC FALSE-POSITIVE REACTION. J. L. Miller, M.D.; Marvin Brodey, M.D., and J. H. Hill, D.Sc. J.A.M.A. 164:1461 July 1957.

Results of the *Treponema pallidum* immobilization test will separate the syphilitic from the biologic false-positive reactor within minor limitations. Studies with this test have indicated an impressively high incidence of biologic false-positive reactions in patients with the collagen diseases, especially systemic lupus erythematosus. The diagnosis of biologic false-positive reaction is potentially serious and should point to questions as to its significance in a given patient.

This study was conducted using 594 patients with positive serological tests for syphilis but negative Treponema immobilization tests. This larger group was divided into two groups, those of known positive reaction of a duration of less than six months and those followed for periods longer than six months. Little difference in the percentage of systemic disease was found between the two groups. Females accounted for 71 per cent of the entire series and 84 per cent of those with systemic disease. The onset of positive reaction in women was found to occur particularly frequently between the ages of 20 and 30. Analysis of a variety of laboratory tests to determine which should be done in a person with an uncomplicated biologic false-positive reaction indicated that cephalin-flocculation and thymol turbidity tests, protein partition, and determination of the sedimentation rate most probably would point to abnormalities.

The diagnosis of biologic false-positive reaction requires careful history taking and physical examination for vague signs and symptoms, especially in young women.—*William J. Amaral.*

■ MALIGNANT EPITHELIAL TUMORS OF THE MANDIBLE AND MAXILLA. H. C. Stoll, M.D., F. C. Marchetta, M.D., and R. Schobinger, M.D. A.M.A. Arch. Path. 64:239 Sept. 1957.

This report reviews 34 cases from the files of Rosewell Park Memorial Institute that were diagnosed as ameloblastoma of the mandible or maxilla. Seventeen of these were found to represent ameloblastoma and 17 were found to be carcinomas.

The histopathologic diagnoses of ameloblastoma were based on the following basic patterns: (1) solid sheets of cylindrical cells surrounding stellate reticulum; (2) cystic lesions with or without squamous metaplasia of the reticular stroma, and (3) primitive cords of epithelial cells in a loose fibrous matrix.

It was noted clinically that all patterns were similar in behavior and prognosis, with the exception of one case. In this instance, biopsy specimens were taken over a period of years which showed a classic pattern of ameloblastoma. There was progressive metaplasia of the stellate reticulum. There eventually developed extensive local recurrences and finally metastasis to a cervical lymph node. Biopsy at that time showed both ameloblastoma and squamous cell carcinoma in the locally recurrent region. The lymph node metastasis consisted of a typical keratinizing squamous cell carcinoma. This may represent a case of squamous cell carcinoma arising from an area of squamous metaplasia within an ameloblastoma.

It was noted that there was a high incidence of recurrence after treatment by curettage or irradiation. Therefore, more extensive surgical excision, marginal resection and mandibulectomy is recommended for both primary and recurrent tumors.

The 17 remaining carcinomas were found to include the anenoid-cystic, cylindromatous, squamous cell carcinomas and anaplastic types. It is felt that these tumors represent primary carcinomas of the jaws and is explained by the embryonic infolding of oral epithelium into the developing jaws. Because initial diagnosis in these cases was ameloblastoma, therapy consisted of local excision and irradiation. Metastasis and death occurred in

four instances out of 11 in which cylindroma had been the diagnosis. All of the carcinomas listed merited more aggressive surgery to offer the best chance of cure.

The point is well taken by the authors that the mistaken diagnosis of ameloblastoma is often made in the presence of an epithelial tumor of the jaws. This may lead to misdirected and inadequate therapy.—*Gilbert S. Small.*

■ A Prosthetic Mandibular Head: Case Report. Stuart Gordon, M.D. Plast. & Reconstr. Surg. 20:62 July 1957.

The loss of one, or even both, mandibular condyles can be compensated for by training a cooperative intelligent patient so that the development of an open bite is prevented. Given a patient without these characteristics, more radical treatment is indicated. The patient had suffered a fracture dislocation of the left mandibular condyle and a fracture of the right condyle without displacement. It became obvious that he was developing an open bite in spite of all attempts to obtain his help in prevention. The left mandibular condyle and neck were excised and replaced by an acrylic prosthesis of similar shape. After the operation his mandibular function became normal but he had a partial facial palsy on the left side. The latter disappeared slowly over the following few months.—*Herbert J. Bloom.*

■ Salivary Gland Tumors and Miscellaneous Associated Problems. J. C. Gaisford, M.D., and D. C. Hanna, M.D. Plast. & Reconstr. Surg. 19:458 June 1957.

This paper reviews 156 instances of salivary gland tumors from 1950 to 1956. In the patients with tumors of the parotid gland, there was age spread of from 3 months to 75 years, the average age being 43 years. The chief complaint was a painless swelling in front of or below the ear. Pre-existing facial paralysis was present in some instances. As far as diagnosis is concerned, sialography is of very limited value. Clinical examination usually can determine if the tumor is in the superficial or deep lobe. If the tumor is in the deep lobe, it cannot be palpated when the patient's mouth is open but only when the mouth is closed. Aspiration and preliminary biopsy are not advocated. The incisional biopsy with frozen section at surgery is used.

During surgery, the conventional Y incision is used and the skin flap is dissected anteriorly. The dissection of the gland begins at its anterior edge and extends posteriorly with careful identification of the facial nerve branches. All cysts and benign tumors are excised locally except the benign mixed tumor. Total parotidectomy with preservation of the facial nerve is used for benign mixed tumors, benign mucoepidermoid tumors, malignant mixed tumors, mucoepidermoid carcinoma, cylindromatous carcinoma and acinar cell carcinoma. A total parotidectomy with radical neck dissection is done for squamous cell carcinoma and undifferentiated cancer. Lymphosarcoma and Hodgkins disease are best treated by roentgenotherapy.

A similar array of tumors involves the submaxillary gland. However, a higher incidence of malignant tumors was found. A similar surgical plan of exposure of the gland with frozen section is advocated. The extent of surgery is governed by the malignancy of the tumor and its proximity to anatomic structures. Salivary gland tumors do occur in children and may be malignant. Similar surgical treatment is advocated.—*Gilbert S. Small.*

■ Ranulas with Extension into the Neck (So-called Plunging Ranulas). George Crile, M.D. Surgery 42:819 Nov. 1957.

Cysts of the sublingual gland usually are indicated by swellings of the floor of the mouth called ranulas. Two case reports are presented in which the ranula gravitated downward into the neck resulting in a soft, cystic mass filled with mucus. This mass may be present in the mid-neck or may descend further down in the neck. Treatment by aspiration of the mucus or simple excision of the cyst has not resulted in cure. The cyst will recur unless the surgical

procedure is carried upward to include the salivary gland from which the cyst is originating. This procedure was utilized in the two instances described with resultant cure.

Alternative procedures mentioned are removal of the salivary gland from which the cyst emanated without removal of the cyst, since there is no epithelial lining of the cyst, and converting the cyst to a draining sinus by inserting a mushroom catheter to drain it. At a secondary operation the sinus can be followed up to the salivary gland and the gland excised.—*Gilbert S. Small.*

■ EXPERIMENTAL ENZYMATIC DISSOLUTION OF SOFT TISSUE HEMATOMAS. I. STREPTOKINASE-STREPTODORNASE AND HYALURONIDASE. C. Allen Wall, M.D., and C. Rollins Hanlon, M.D. Surgery 42:536 Sept. 1957.

The dissolution of soft tissue hematomas might best be facilitated by combining the fibrinolytic property of streptokinase-streptodornase to promote liquefaction of the blood clot and the spreading factor of hyaluronidase to aid in dispersion of the liquefied blood. An investigation was conducted to compare and evaluate the effects of these enzymes in facilitating the resorption of experimentally produced hematomas in dogs.

Skin folds in each groin of anesthetized dogs were isolated by rubber-shod intestinal clamps; and into these regions 100 cc. of freshly drawn blood from the heart was injected and allowed to clot. Resulting hematomas of the right side were injected with various combinations of enzymes and equal volumes of saline solution were injected into the hematomas of the left side which served as controls.

Twenty-one mongrel dogs were divided into four groups as follows:

1. Five dogs, in which solutions of 25,000 units of streptokinase and 6,250 units of streptodornase in 5 cc. of saline solution were tested on the right side. On the experimental side the hematoma was smaller and softer in 24 hours in 4 of the 5 animals and the rate of absorption was moderately accelerated in 3 of the 5 animals.

2. Five dogs, in which 400 viscosity units of hyaluronidase in 12 cc. of saline solution was injected into the right side. With hyaluronidase alone added to the hematoma, neither the initiation of the resorptive process nor the time for complete dissolution were significantly accelerated.

3. Five dogs, in which the right side hematoma received 50,000 units of streptokinase, 12,500 units of streptodornase, and 400 viscosity units of hyaluronidase diluted to 12 cc. of saline solution. In this group the hematoma was not only smaller and softer in 24 hours, but also complete resorption was significantly accelerated in all five of the dogs.

4. Six dogs, in which 50,000 units of streptokinase, 12,500 units of streptodornase and 200 viscosity units of hyaluronidase were diluted to 12 cc. of saline solution and injected into the right side hematoma. In this group the control side received equivalent amounts of streptokinase and streptodornase in 12 cc. of saline solution. On the side with hyaluronidase added to streptokinase-streptodornase, a smaller, softer hematoma occurred within 24 hours in 5 of the 6 dogs. The rate of resorption was accelerated in 5 of 6 dogs with the instillation of both enzymes.

In general, there were no deleterious effects to the tissue demonstrated in 24 dogs with hematomas produced similarly when streptokinase-streptodornase and hyaluronidase were added both alone and in combination.

It is suggested that soft tissue hematomas be managed clinically by the installation into the hematoma of both streptokinase-streptodornase and hyaluronidase, one ampule of each, diluted to 10 to 20 cc. with saline solution. This should be carried as soon after the hematoma forms as is feasible and repeated daily for two or three days. The theoretical objection that streptokinase-streptodornase will initiate hemorrhage by lysis of the clot of a previously bleeding vessel has not been confirmed experimentally or clinically.—*William J. Amaral.*

Announcements

■ Second Institute on Hospital Dentistry Scheduled for June 2-5

The Second Institute on Hospital Dentistry, sponsored jointly by the American Dental Association, the American Hospital Association and the American Medical Association, will be held June 2-5 at the Edgewater Beach hotel in Chicago.

Frank B. Hower, secretary-treasurer of the American Society of Oral Surgeons; Fred A. Henny, editor of JOURNAL OF ORAL SURGERY; H. Cline Fixott, Jr., chairman of the Council on Hospital Dental Service, American Dental Association; and M. L. Allison, J. P. Looby, O. J. McCormack and P. J. Sheridan, members of the Council, will direct the work of the committees during the four day Institute. Others who have been invited to participate in the program include officials from the three sponsoring associations, directors of dental services and hospital administrators, directors and trustees.

The subjects listed for the June 2 session are "Governing Board's Responsibility for Patient Care," "How the Hospital Functions" and "Needs and Values of a Hospital Dental Service." On the morning of June 3, dental service in hospitals and staffing the dental service will be the topics for panel discussions. A tour of Zoller Dental Clinic will be conducted in the afternoon.

A panel discussion on the effects of third party payment plans on hospital dental service will be held June 4, with group discussions following in the afternoon. "A Look Around the Corner—What is Ahead in Hospital Care" will be a topic on the final day.

According to Gerard J. Casey, secretary of the Council on Hospital Dental Service, reservation blanks can be obtained by writing the Council at the Central Office of the American Dental Association or the Institute office, American Hospital Association, 18 E. Division St., Chicago. The fee is $40 a person.

■ American Academy of Dental Medicine to Meet May 29-31

The American Academy of Dental Medicine will hold its 12th annual meeting in Montreal, Canada, May 29-31.

The scientific program will concern the interrelationship of oral medicine and general medicine. Topics will include "The Dentist and the Endocrine Problem," "The Internist," "The Obstetrician," "The Pharmacologist," "Inflammatory Diseases of the Mucous Membranes of the Mouth," and "Contact Dermatitis of the Face and Hands."

Programs and reservations may be obtained through George Witkin, 45 S. Broadway, Yonkers 2, N. Y.

■ Byron S. Hollinshead to Direct Two Year Survey of Dentistry

The Commission on the Survey of Dentistry selected Dr. Byron S. Hollinshead to direct the two year survey, financed by the Kellogg Foundation, the American Dental Association, the Rockefeller Brothers Fund and the Louis W. and Maud Hill Family Foundation. The American Council on Education will supervise the survey.

Dr. Hollinshead, former president of Coe College in Cedar Rapids, Iowa, recently was director of the technical assistance department of the United Nations Educational, Scientific and Cultural Organization in Paris and has also served as a consultant to the Commission on Financing Higher Education.

■ Berkshire Conference on Oral Pathology, Periodontology Set for June

The Ninth Berkshire Conference on Oral Pathology and Periodontology will be held June 15-19 at Eastover in Lenox, Mass. The central theme of the conference, which is sponsored by the division of graduate and postgraduate studies of Tufts University School of Dental Medicine, will be "Gerodontics—Oral Problems Associated with Aging." The program is arranged so that mornings and evenings are devoted to professional activities and the afternoons are open for recreation.

Speakers will include Joseph L. Bernier; Irving Glickman; Max Gratzinger; Bernard Jankelson; Herbert Mescon, M.D.; Edward J. Stieglitz, M.D., and Joseph P. Weinmann.

Further information and application forms can be obtained from the Conference office, Tufts University School of Dental Medicine, 136 Harrison Ave., Boston 11.

■ University of Texas Schedules Course in Maxillofacial Surgery

A five day postgraduate course in maxillofacial surgery will be given June 16-20 at the University of Texas Dental Branch in Houston.

The course will be conducted by Edward C. Hinds, professor of surgery at the school, and will include lectures, seminars and demonstrations on diagnosis and treatment of fractures, neoplastic diseases and developmental deformities. Guest lecturers will include Stanley L. Lane, chief of the head and neck service, Albert Einstein Medical Center, New York, and Col. Richard E. Burch, chief of the oral surgery service, Lackland Air Force Base, San Antonio.

■ Minerva Stomatologica Becomes Official Organ of Two Dental Groups

The journal *Minerva Stomatologica* is now the official organ of both the Italian Dental Society (Società Italiana di Odontostomatologia) and the Italian Society for Oral Surgery (Società Italiana di Chirurgia Maxillo-Faciale). The oral surgery group was founded June 6, 1957, during the Third International Medical and Surgical Meetings in Turin, Italy.

■ Dental Anesthesia Society Founded in England

The Society for the Advancement of Anaesthesia in Dentistry, a newly founded group in England, is now issuing digest reports of its meetings which are available to associate members. The Society is also forming advisory panels on anesthesia and equipment that will transmit information to members on request.

The Society may be contacted at 53 Wimpole St., London.

■ Group to Study Laws Affecting Medical and Biological Research

A program to modernize outmoded state laws affecting such matters as the desire of people to will parts of their bodies for use as transplants, the development of new drugs and therapies and experimentation with humans and animals has been undertaken by the National Society for Medical Research.

The Society plans to call a conference of leaders in the science fields to recommend a uniform act for submission to the National Conference of Commissioners on Uniform State Laws and

eventually to state legislatures. A preliminary survey on existing laws has been completed by a committee of the Society.

Dr. Lester Dragstedt, president of the Society, announced the plans at the group's annual meeting in Chicago in February. Lon W. Morrey, editor, American Dental Association, serves on the Society's Board of Directors.

■ University of California to Give Course in Oral Medicine

The University of California School of Dentistry will present a postgraduate course, "Dental Medicine: Dynamics of Diagnosis and Treatment" May 23 and 24 in San Francisco.

Topics will include "Principles of Roentgenographic Interpretation in Patient Evaluation," "Current Concepts on Commonly Occurring Intraoral Lesions," "Considerations of Radiation Dangers in the Role of Diagnosis," "Emergencies and Resuscitative Measures in General Dentistry," "Biochemical Considerations of Tooth and Bone Structures," and "Pharmacologic Considerations in Clinical Dentistry." Rotating sections will consider roentgenographic interpretation of hard tissue lesions, emergency drugs and resuscitative measures, and laboratory procedures of value in differential diagnosis. A symposium on commonly occurring diagnostic and therapeutic problems in dental practice will conclude the course.

The fee for the course is $50.

■ Residency and Internship in Oral Surgery Offered in Cleveland

A residency and an internship in oral surgery are available beginning July 1 for the year 1958-1959 at St. Vincent Charity Hospital in Cleveland. The programs are presently being considered for approval by the Council on Dental Education of the American Dental Association.

Further information can be obtained from Norman H. Denner, chief of the oral surgery department at the hospital, E. 22nd St. and Central Ave., Cleveland.

■ Becker Joins Work on Study of Anesthetic Agents

Charles E. Becker, Ph.D., is new chief laboratory investigator for a research project on how local anesthetic agents are metabolized by normal physiologic enzymes. The project is being conducted under a grant from the Public Health Service and is being carried out in the American Dental Association's division of chemistry in Chicago.

Dr. Becker, a biochemist, recently was chief of the research laboratory at the Veterans Administration Hospital, Louisville, Ky., and he holds a reserve commission in the Medical Service Corps of the Army.

■ Gordon Conference on Bones and Teeth to be Held

The Gordon Research Conference on the Chemistry, Structure and Physiology of Bones and Teeth will be held at Kimball Union Academy in Meriden, N. H.

The conference is one of a series of conferences on various subjects to be held from June 9 to August 29. Further information can be obtained from W. George Parks, director, department of chemistry, University of Rhode Island, Kingston, R. I.

■ New Society in Venezuela Announces Officers

The Sociedad Venezolana de Cirugía Oral, officially founded late last summer, has announced the names of its officers. Pedro M. Vargas Salerno is president; Pedro Léon Torres, secretary; Atilio D'Elia O., treasurer; and Charles Vanderdys and Gloria Uzcátegui, members.

The address of the new society is Apartado de Correo 10575, Dabana Grande, Caracas. The group operates under the auspices of the Colegio de Odontólogos de Venezuela.

■ Horace Wells Club Recognizes John S. Lundy

The Horace Wells Club, named for a Hartford, Conn., dentist who discovered anesthesia, presented its annual award of merit to Dr. John S. Lundy of Minneapolis, who founded the section of anesthesiology of the Mayo Clinic and is presently professor of anesthesia in the Mayo Foundation.

■ Navy to Use Short-Life Isotopes in Dental Studies

A nuclear dentistry branch has been established at the Naval Dental School, National Naval Medical Center, Bethesda.

The branch will use short-life isotopes produced by a nuclear reactor installed recently in the Medical Center for clinical and laboratory research in dentistry. The isotopes will provide the same diagnostic information as longer half-life isotopes and will lessen the amount of internal body radiation to which subjects are exposed.

■ Middle Atlantic Society of Oral Surgeons to Meet in May

The Middle Atlantic Society of Oral Surgeons will meet May 21 at the Lord Baltimore hotel, Baltimore.

The morning portion of the all day program will consist of a talk on diagnosis and treatment planning for the cleft lip and cleft palate patient by Herbert Cooper, founder and director of the Lancaster, Pa., Cleft Palate Clinic. The afternoon program will include a film on new methods of resuscitation and a lecture on neuralgia of the face and head.

Lloyd E. Church is president of the society.

Editorial communications

■ ORIGINAL COMMUNICATIONS—This journal invites concise original contributions in the broad field of clinical and experimental surgery of the mouth and associated structures, including roentgenology, diagnosis, anesthesia and oral surgical pathology. Articles are accepted for publication with the understanding that they are contributed solely to the JOURNAL OF ORAL SURGERY. All manuscripts are subject to editorial modification. Neither the editors nor the publishers accept responsibility for the views and statements of authors expressed in their communications.

■ MANUSCRIPTS—Manuscripts submitted for publication should be sent to Fred A. Henny, Editor, Henry Ford Hospital, Detroit, Michigan.

Manuscripts should be typewritten on one side of the paper only with double spacing and liberal margins. The author's name and abbreviated title of the article should appear at the top of each manuscript page. The original should be sent to the editor and a carbon copy retained by the author. Manuscripts will not be returned if accepted for publication.

References should be placed at the end of the article and should conform to the style of the Quarterly Cumulative Index Medicus; viz., name of author, title of article and name of periodical with volume, pages, month and year. They should be numbered and should appear in the same order as that of the superior figures inserted in the appropriate positions in the text.

■ ILLUSTRATIONS—Illustrations accompanying manuscripts should be unmounted and numbered. The author's name should appear on the margin or back.

Authors should insert figure numbers at appropriate places in the text. The original drawings, or glossy print photographs of them, should accompany the manuscript. Legends for illustrations are to be typewritten in a separate list with numbers corresponding to those on the photographs and drawings.

A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editors for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered in India ink or with black typewriter ribbon (carbon paper placed with carbon against back of sheet for bolder type). Ordinary blue or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

■ CASE REPORTS—Case reports will constitute an important department of the journal and the editors welcome case reports that are of unusual clinical value or that represent exceptional conditions of interest.

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